



ceramic decoration

by Lois Culver Long

Schulmeister

Foreword

Pottery is the oldest of the arts, and the urge to decorate it is just as ancient.

We weren't there, of course, but we suspect that the first designs were crude finger and stick prints. These are still used artfully today, but the accumulated experience of the ages and our great scientific advances in the last few years have combined to offer an infinite variety of decorating methods and materials.

To the best of our knowledge, this is the **first** comprehensive booklet devoted solely to the countless materials and methods available for ceramic decoration. In simple, concise terms, we have tried to provide practical basic information on virtually every decorating method. Examples have been carefully selected and described to illustrate good use of each material and method.

The purpose of decoration is to add interest and beauty beyond utilitarian requirements. Simplicity and appropriate relationship of the decoration to the whole form is more important than slavish technique. In ceramic decoration, the possibilities for exploring line, color, and texture relationships are limitless. Each design variation creates a unique pot. Actually each decorative technique utilizes very few materials and tools. Every clay and decorating medium can be used in many ways. Our purpose is to suggest when and how to use them for best results.

We have attempted to approach each project differently as a stimulus to original work.

Many of the pieces by professional potters which are illustrated in the booklet were made for us using Amaco and Fine Art materials exclusively. Several others are prize winners from the Ceramic Nationals, and the National Scholastic Competitions for artists in junior and senior high schools. A number of award pieces are in the American Art Clay Company collections.

Whether hobbyist or professional, we believe you will find this a handy direction booklet and idea guide when selecting materials and planning ceramic projects.

Detail: Sculptured Plaque 20" x 14" x 3". Bas relief. Unglazed stoneware stained with oxide.
Ernie Kim, California School of Fine Arts, San Francisco.
Eschenbruecher Jr., Los Altos.

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by Lois Culver Long

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Specially posed photographs—Robert Twente, Indianapolis

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"Young Eagle." 30" H. Stamped or pressed decoration. Clay was stained with manganese and cobalt oxides. High fired. W. W. Swallow, Allentown, Pennsylvania.

Edgar T. Clewell.

ACKNOWLEDGMENTS

Cover: Peter H. Voulkos, well known Los Angeles ceramic innovator and juror, photographed three pieces of his own stoneware for our cover. The wheel-thrown and slab garden sculpture is over three feet high.

Book: *All examples in the underglaze sections made by Edgar Littlefield, Justin Brady, F. Carlton Ball (except page 24 and 27), and the author were produced especially for the American Art Clay Company using Amaco and Fine Art materials exclusively.*

To the many individuals and organizations who gave us technical advice and addresses, who lent us their works, checked details and secured photographs for us, I extend my sincere thanks. Special mention is due the Syracuse Museum of Fine Arts, conductor of the **Ceramic National Biennial Exhibitions** (Henry Bozeman photographs); The John Herron Art Museum, conductor of the **Indiana Biennial**; **Scholastic Art Awards** for Junior and Senior High Schools, conducted nationally by **Scholastic Magazines**; F. Carlton Ball; Edgar Littlefield; Aaron Bohrod;

Cecil G. Strawn, Jr.; Peter H. Voulkos; Ernie Kim (Eschenbruecher, Jr. photographs); Cranbrook Foundation (McVey photograph by Harvey Croze); Noël Waite; W. W. Swallow; Sister Magdalen Mary, I. H. M.; Fong Chow; Anne Chapman; Abraham Cohn; John W. Delaplane; Betty W. Feves; Maija Grotell; Blanche Hutto; June E. Kapos; Eugene Friley; Stanley Fistick; Karen Karnes; David Weinrib; Irene Kolodziej Musick; Ann Kucera; Charles Lakofsky; Harvey K. Littleton; Wayne Long; Thomas F. McClure; Leza S. McVey; Gordon Martz; Edwin and Mary Scheier; Karl Martz; Mary Kring Risley; D. J. Siegfried; Bengt Nordquist, representing The American Federation of Arts for **Design in Scandinavia**; The Cleveland Institute of Art; **Ceramics Monthly** magazine; **Craft Horizons** magazine; Rudolf Staffel; Ceramic League of Miami; Lowe Gallery, University of Miami; Polia Pillin; Mae Reed; Richard Petterson; Loris L. Suite; Washington Kiln Club; Jayne Van Alstyne; Thelma Frazier Winter; Bonnie Staffel; The Toledo Museum of Art; Art Department, University of Illinois; The Edward Orton Jr. Ceramic Foundation.
L. C. L.

Lois Culver Long began this book as one of her first assignments at the American Art Clay Company, which she joined immediately after receiving her Master's Degree in Fine Arts from Southern Illinois University, where she had been a Student Assistant to F. Carlton Ball.

At that time, the book was envisioned merely as a 16 page advertising brochure which would illustrate every way a decorating material could be used. The full-blown book that developed is characteristic of Mrs. Long's capacity to give the subject the complete treatment. When metal enameling was in its infancy as a national pastime, for example, Mrs. Long suggested the creation of a 4 page flyer on the subject. She quickly expanded the modest little piece into a 24 page booklet which, at this writing, is in its fifth printing in order to accommodate requests that have passed the 85,000 mark.

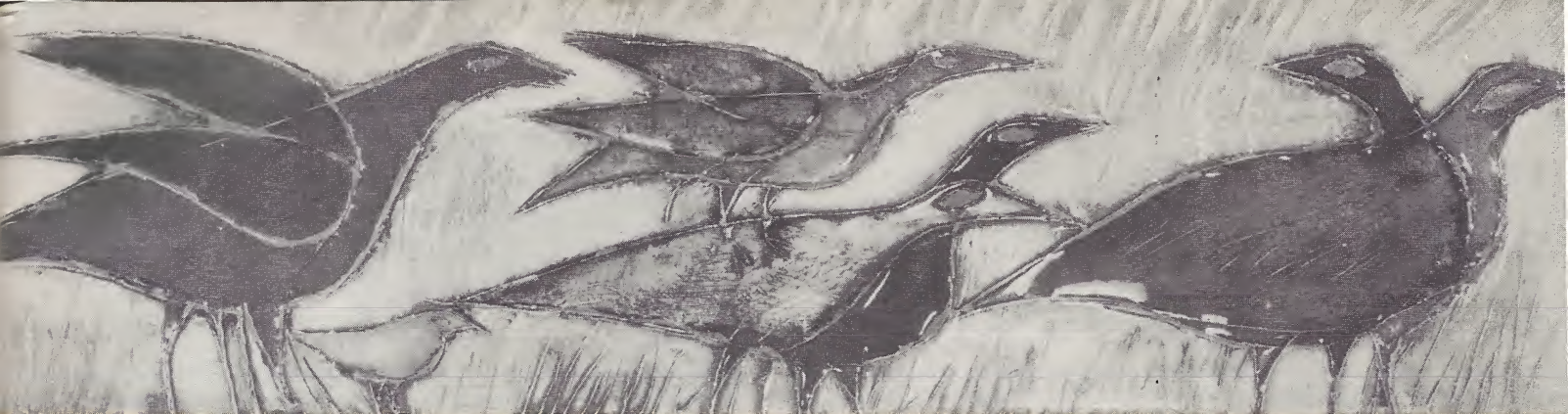
Although the author has entitled her latest effort "Ceramic Decoration" her husband, head of an Indianapolis public relations counseling firm, insists that a more appropriate title would have been "Sequel to War and Peace"—a humorous reference to the length of time she has been working on the project.

Periodically, Mrs. Long teaches ceramics in various recreation leader workshops throughout the United States. Her present plans include the building of a home among the trees along Crooked Creek in northwest Marion County,



Hartley Alley, Bloomington, Ind.

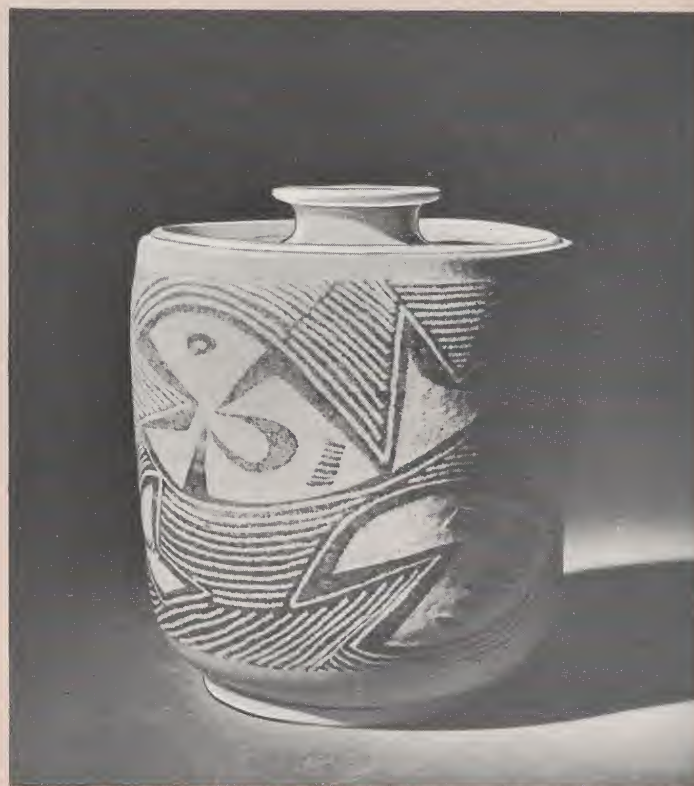
just outside Indianapolis. There, Mrs. Long will pursue her hobby of gardening in the shade. Also on the agenda is a large stoneware kiln because she is anxious to concentrate on potting. "I want to get back in shape in order to take some of my own advice", she said.



Plaque by Rut Bryk of Finland. Ceramic "cloisons", flooded with translucent glazes. See page 36.

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Left: A page from the sketchbook of Aaron Bohrod, Artist in Residence at the University of Wisconsin. Mr. Bohrod has continued to develop the basic fish theme while decorating the wheel-thrown stoneware pitcher and covered jar formed by his partner, F. Carlton Ball. Mr. Bohrod's selections of decorating materials and methods were governed by the effects he wished to bring forth.

Preparation



KEEP YOUR SKETCHES! A well filled sketchbook can be your key to successful potting.

Sketches help to form concrete ideas from vague, abstract thoughts for both surface decoration and form. Good ideas can be adapted endlessly to produce many unique pots.

WORTHY DECORATIONS DESERVE GOOD FORMS. Inspirations for form are just as valuable as inspirations for surface manipulation. They are often born together, and need not be separated. A close relationship of surface and form is the decorator's aim.

Disregard any inclination to improve a poor pot with decoration. No amount of painting or tooling can disguise bad contours. Therefore, do your decorations a good turn by planning them for your best pots.

EXPERIMENT WITH YOUR MATERIALS. Refer to the storehouse of ideas in your sketchbook for guidance and stimulation, but do not use it as a tracebook. You may change the approach radically when you try out some of your inventions. The materials themselves will inspire you to new adaptations of design, form, and materials.

Covered Jar was sponged with blue engobe. To complement the sturdy form, vigorous sgraffito lines were scraped through to the buff body.

Pitcher. The serene fishes are pastel underglazes delicately painted on the surface of an unfired matt glaze. Fine sgraffito lines were cut into the glaze at intervals, echoing some of the sketch ideas.



Tools

Many tools used to shape pottery are also used to decorate it. A basic kit might include:

- a. Decorating wheel for banding and rotating objects.
 - b. Two or more plastic slip trailers.
 - c. Large plastic bag to keep projects damp.
 - d. Large round or flat brushes for glaze and slip application.
 - e. Bamboo brushes, large and medium, for wax resist and all around use.
 - f. Small pointed brushes for details.
 - g. Spring steel flexible scraper, half moon shape.
 - h. Common pin to check glaze thickness.
 - i. Glazed tile for spatula blending.
 - j. Amaco steel plaster and clay modeling tools, Nos. 16 and 99, for sgraffito, spatula blending, incising, scraping, etc.; broken hack saw blades, sgraffito tools.
 - k. Elephant ear sponge.
 - l. Amaco No. 14P professional boxwood modeling tool.
 - m. Amaco No. 601 steel loop modeling tool.
 - n. Fettling knife for trimming.
 - o. Transparent plastic ruler.
 - p. Pencils, and perhaps India ink.
 - q. Sketch paper.
 - r. Scissors.
- Plastic water container, quart size.



Earthenware Stoneware Porcelain explained

Ceramic clay bodies can be classified in many ways, but mainly according to density and firing temperature.



Stoneware Bowl. Wax resist decoration with slips on buff clay. Cecil G. Strawn, Northern Illinois State College, DeKalb. Award, 3rd Annual Exhibition, Ceramic League of Miami, Florida. *Lowe Gallery*

Earthenware is comparatively porous and not watertight unless fired to maturity and glazed. Earthenware clays include many natural colored plastic clays, talc bodies, red grog bodies (terra cotta), and specially compounded white bodies. Many earthenware clays mature at Cone 06 (1859° F.)¹, a universally used "low fire" temperature. Red terra cotta bodies could be termed "medium fire," as they usually mature between Cones 01 and 4 (2093°-2174° F.), depending on composition.

Stoneware is hard, dense, and strong when fired to maturity at higher temperatures. Natural stoneware clays are usually buff or grayish in color, and quite plastic. The stoneware firing range is very broad, extending from Cone 4 to Cone 8 (2300° F.), a "high fire" temperature. Specially insulated kilns are required for high temperature work.

Porcelain is translucent, vitreous, and strong when fired to maturity at high temperatures. The color and texture are more refined than stoneware, and it is impervious to water even without glaze. Porcelain bodies are always compounded, combining the less plastic white china clays with choice, pulverized, ceramic raw materials. Again, the maturing temperature is dependent upon body composition. Some porcelains mature at Cone 4 (2174° F.), while others need to be fired as high as Cone 16 (2669° F.), a "very high fire" temperature.

¹Temperature equivalent when fired rapidly at approximately 300° F. per hour.



Clay Itself

distinct and beautiful



Hot Dish Tile. "Deity of the Inca Culture"
—Friley-Fistick designers; Kilnforms, Inc., Columbus, Ohio. Press-molded red clay sprayed with textured green glaze.

IMPRESSING

PRESSING DESIGNS into plastic clay is the most natural way to begin decorating. Impress the clay form or slab only when it is firm enough to hold a clear outline of the tool.

Fingers, sticks, combs, pencils, cord, and clay stamps make interesting indentations. Decorative bisque fired clay roulettes can be rolled over the clay to impress designs in continuous bands. The imprint of the tip and side of one or two tools can be repeated, overlapped, alternated, or reversed to create innumerable patterns.

Deep textures are more suitable for the exteriors of large decorative objects, such as lamp bases, than for ash trays or dishes which require careful cleaning.

Glazing is optional. However, a heavy glaze application is strikingly beautiful on manipulated surfaces. Glaze can be pooled into the impressions only, in order to produce textural extremes.

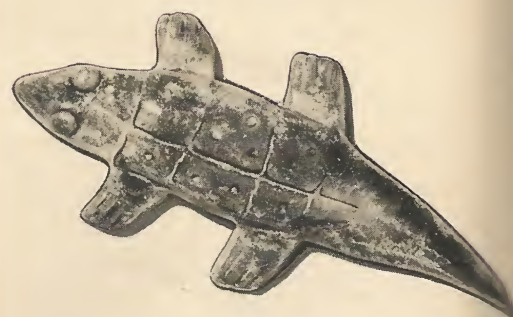
Preposterous Pet. *Experimental sculpture impressed with bisque stamps and common objects*—Richard Petterson, Scripps College, Claremont, California. The animal was cut from a buff clay slab, draped over a cloth covered hump, then modeled slightly. Clay cones were added for spines. When the clay was firm enough to hold its shape, several small balls were pressed onto the body and imprinted. After bisque firing, tan satin-matt glaze was brushed over-all.

Coil-built Earthenware Bowl. Indian Red Clay. Outside texture imprinted with a modeling tool. After bisque firing to Cone 08, opalescent white glaze was stippled into the impressions. Then the

entire bowl was brushed with opalescent turquoise glaze and fired to Cone 05. The white blended with the turquoise, showing the impressed coils to good advantage.

Slab Alligator—Sister M. Remy, Mount Mary College, Milwaukee, Wisconsin. Indian Red Clay impressed with a dull pencil. Opalescent turquoise glaze. Cone 05. Made at Amaco Summer Workshop for Teachers.

Slab-built Black Bisque Vase—George Feliciano, San Pedro High School, California. 27th National Scholastic Award. Surface textures were traced and impressed with a wooden stick.

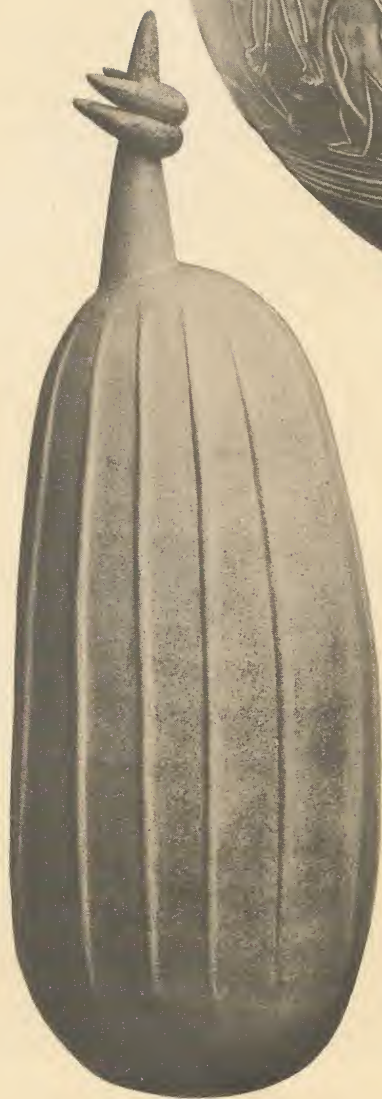




Stoneware Bowl. Modeled Surface. Edwin Scheier, Durham, New Hampshire. Prize 16th Ceramic National. Rolls of plastic clay were moistened and modeled onto the almost leather-hard wheel-thrown bowl to fashion the figures.

Ceramic Form No. 28. 31". Vertical ribs were modeled onto the finished slab and coil-built form. Flecked tan matt glaze was sprayed and brushed over-all before a stoneware single firing. Liza S. McVey, Cleveland, Ohio.

Chalice. Blue low fire clay sprigged with white low fire clay. Justin Brady, American Art Clay Co. Tall form was thrown in two parts and joined before sprigging. Transparent glaze was sprayed over-all following bisque firing.



APPLIED ORNAMENT

CLAY ROLLS, BALLS, STRIPS, THIN CUTOUTS, and other shapes can be notched, twisted, modeled, stamped, beaten, or smeared as they are attached to firm moist clay. Handles and knobs are often added for utility and decoration. Very soft clays will unite permanently when moistened and pressed together. Firmer clays should be luted with a thick slip or slurry composed of body clay and water.

APPLIQUE Small rolls and relief cutouts of plastic clay are joined to an almost leather-hard shape with slurry. The shape must be dried slowly to prevent loosening.

SPRIGGING Low relief clay motifs of the same or a contrasting color can be removed from shallow press molds by rubbing the motifs lightly with the back of a spoon until they curl and fall out. The motifs can be transferred to the damp clay with a wet knife. Wedgwood is done in this manner.

Colonial craftsmen achieved easier, comparable results by casting relief designs with the shape itself. They painted the ornamental depressions of a plate or pitcher mold with white casting slip, then immediately filled the mold with colored casting slip of similar composition.

Feline. Wayne Long, Los Angeles. Award for Ceramic Sculpture, 18th Ceramic National. Circle designs applied in high relief add to the basic ceramic qualities. This 20" x 10", green-glazed terra cotta sculpture would make an appropriate garden piece.



SHALLOW ANGLED GROOVES, flutings, and cuts of varying widths and depths can be engraved or gouged into stiff clay with fine combs, steel plaster tools, loop-end tools, or broken hack saw blades, etc. Prominent curves on thick, half-dry forms can be planed flat or faceted with a knife.

INCISING Like the master potters of the Sung Dynasty, one can become adept at combing and carving leather-hard forms. Chisel shaped implements and fine combs produce crisp, free patterns. Sharp points tend to dig furrows. A single glaze adds depth and color to engraved lines.

Thin porcelain can be incised to appear more translucent. A soft bisque firing (Cone 010) toughens it for safe carving.

PIERCING Tiny openings are sometimes pierced or cut through porcelain or other clays with a stiletto or small drill bits. When filled with glaze and fired, they look like miniature windows.

CUTTING and CARVING *the Clay Itself*

Giant Wheel-thrown Bowl. *Incised with loop tool.* Emma Lou Brady, Bethesda, Maryland. Award, Washington Kiln Club. A coat of metallic brown glaze complements the incised rectangles.

Tall Free Form Vase 15" and Double Vase with Candle Holders 9½" x 13". Karen Karnes, Stony Point, New York. Prize, 16th Ceramic National, Syracuse Museum of Fine Arts, Syracuse, New York. Objects were formed by pressing earthenware clay into plaster molds. Grooves and tiny balls were formed by gouging the moist clay with a wooden tool. When bisque fired, the tall form was sprayed with olive textured matt, while orange matt was sprayed on the double vase.





Porcelain Wine Set. Incised and Pierced. Justin Brady, American Art Clay Company. Bottle 4" x 7½", wheel-thrown of white porcelain modeling clay. Six matching cups cast with porcelain slip in a one-piece mold. Shallow, angled lines were carved into the "black-hard" bottle with the corner of a razor blade. When the thin cups were of leather-hard firmness, tiny, rice-shaped slits were cut entirely through the walls. The rest of the design was lightly incised. Cone 08 was used for bisque firing.

The slits in the cups were closed by stippling with light blue high fire glaze. Cups were dipped in the glaze, and the bottle was sprayed with the remainder. All pieces were fired to Cone 5. The blue color appears translucent in the glaze filled slits, and darker in the incised lines.



Wheel-Thrown Candleholder. Openwork. Cut, carved and pierced with a knife and pointed tool when leather-hard. Pink low fire clay was selected for its excellent carving properties. Following bisque firing, transparent satin matt glaze was brushed over-all. Cone 06 glaze firing. Lois Culver, American Art Clay Co.

Rufous Owl 27¾". Monumental, simplified sculpture. *Incised.* W. W. Swallow, Allentown, Pennsylvania. Prize for garden sculpture, 17th Ceramic National. Amaco buff clay was colored and textured by adding iron oxide, iron fillings, and coarse grog. Good over-all incised pattern was created with wood tools in three sizes. Only the attached plinth is glazed. To create a stony effect, the owl was fired very slowly for three days until Cone 6 was reached.





*Cutting and Carving
the Clay Itself*



EXCISING OR RELIEF CARVING Excised designs create the sculptural effect of low relief. The clay is cut and carved until the designs project from the background. Impressed textures are often worked into the recessed background. Firm, leather-hard clay is best for this exciting technique.

Stoneware Bowl 6 3/4". Excised carving. The carved away background draws attention to the well balanced design. Thomas F. McClure, Norman, Oklahoma. Award 13th Ceramic National, Syracuse Museum of Fine Arts, Syracuse, New York.

Covered Stoneware Jar 23". Peter H. Voulkos, Los Angeles. Award 18th Ceramic National. Design was excised when clay was leather-hard. After bisque firing, dark glaze was sprayed over entire form.



Slips

and Engobes

SLIPS OR ENGOBES are colored clays which have been ground thoroughly with fluxes and water to resemble heavy cream. Slip decoration on unfired clays may range from thin, translucent brush strokes to thick, opaque relief. Gum solution can be added for smoother brushing.

Leather-hard clay shapes are best for most slip decorating methods. Advantages are ease of application and even drying of the similar materials. A wet clay slab is customary for slip combing because drying is slower. If it is necessary to apply slip on *dry clay*, first remove all dust from the surface with a brush, sponge, or blast of air. Sponge the area lightly with water. Apply thinned slip rapidly with a spray gun or full laden brush. Use short, overlapping strokes to cover the absorbent surface evenly. Heavy slip applications could peel off dry clay due to very uneven shrinkage during drying.

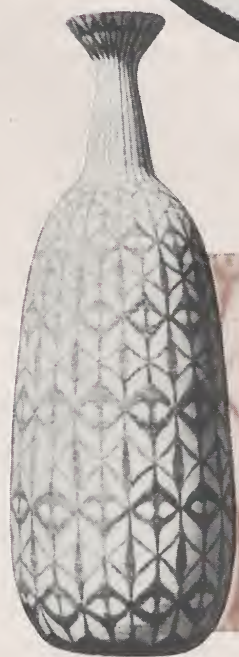
Glaze may be applied to bone dry slip decorated ware. However, bisque firing before glazing strengthens the ware for easier handling.

Slips are engobes! When slips are used to cover objects entirely, they are termed engobes. Many important decorative techniques, as sgraffito, require a layer of contrasting clay over the body clay. Engobes are also used to coat rough or unfavorably colored bodies with a smooth, more attractive surface for slip or underglaze decoration and for glazing.

Dipping and pouring require no special equipment. Thickness should be controlled by judgment. One coat should cover. Permit excess to drain off a corner of the surface. Brushing with creamy-thick engobe is slower, but economical. Cover surface irregularities with back and forth, crosswise and circular strokes using a large, round, short bristle brush. Apply one to three thin coats. Allow each to dry until the surface can be touched without damage. An infra-red lamp placed about a foot away can reduce drying time to a few minutes. Remove loose brush hairs as they burn out and leave blemishes.

Earthenware Plate. Polychrome slip painting. Polia Pillin, Los Angeles. Slip-cast white plate was covered with black engobe. Then, colored slips were intermixed for intermediate tones and shades. Others were blended with white and varying amounts of water to control opacity and translucency. Colors were applied to the damp plate with tiny bits of sponge and very fine brushes. Clear gloss glaze over-all.

Slip Painted Stoneware Bottle—Noël Waite, People's Art Center, St. Louis, Missouri. Bottle was kept damp until intricate painting was completed. Thin white matt glaze.



SLIP PAINTING

Slip painting mixtures are usually thinned until some of the body clay shows through each stroke. This translucent quality increases in the firing due to the mild dissolving action of the glaze coat. Watery slips look weak. Sponge clay with water just before painting with slips. Simple, free strokes from a fully charged bamboo brush are especially pleasing. The shape of a good, soft brush helps dictate the design. Coarse or delicate textures can be developed by applying slips with a dry brush or sponge. Overworked designs always appear forced.

Sculptured Birds. Unglazed red clay with light spatter of baby blue and yellow slips. Dick Wilkins, Cody High School, Detroit. 28th National Scholastic Award.



SPRAYING

Leather-hard or dry pieces may be sprayed with thin slip, using the glaze gun. Graded or intermingled oversprays which combine several colors are attractive.

All-over coverage requires several coats, especially when light colors are sprayed over a dark body. First, spray or brush very thin slip over ornamental details, the inner curves of handles, and other recessed areas. Direct the spray slightly downward to form a smooth, glistening coat temporarily. Rotate the pot slowly during spraying to assure even coverage. Dripping and puddling occur when application is too heavy, or gun is held too close. Liberal drying time between coats prevents the unfired body from becoming saturated and weak. When fingermarks will not mar the surface, spray the next veneer of slip.

STENCILING

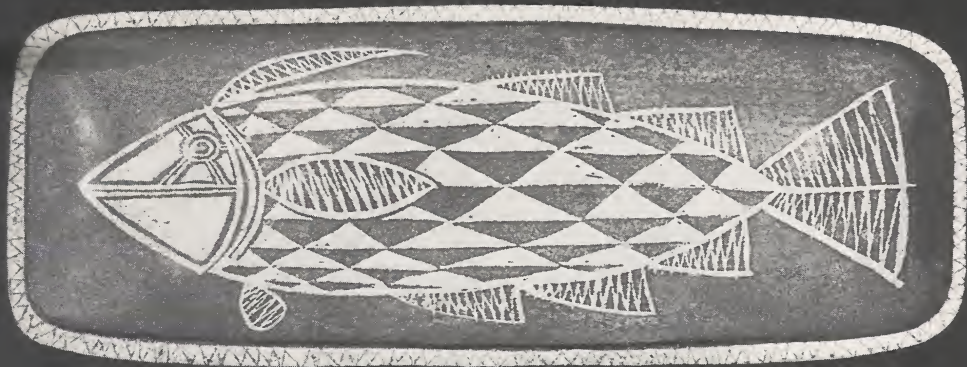
Ancient folk pressed large leaves against their moist pottery before dipping the pots into contrasting slip. When they peeled the leaves, clean cut stencil images surrounded by a thick layer of color were revealed. Incised details were sometimes added.

For fuzzy or graded edges, stiff shapes may be held an inch or two from the pot while spattering or spraying. For precise designs, small positive and negative shapes cut from newspaper may be adhered to leather-hard forms with gum solution. Thick or thin slips are usually sprayed, spattered, dry-brushed, stippled, or sponged around the shapes. More stencils and colors may be used as each application dries. All stencils must be removed with a pin before the final coat hardens, sealing them in.

Large Stoneware Bowl. Stenciled with green and brown slip. Partly glazed. Ernie Kim, California School of Fine Arts, San Francisco.

Stoneware Vase. Paper stencil, affixed to leather-hard buff clay, was sprayed with blue slip and removed. Cone 07 bisque. Clear high fire glaze spray coat, fired to Cone 6. F. Carlton Ball.





Bread Server. Aaron Bohrod brushed a wax fish on this hump-molded tray formed by F. Carlton Ball. A few details were engraved through the wax before spraying with a contrasting slip.

WAX RESIST *with Slips and Engobes*

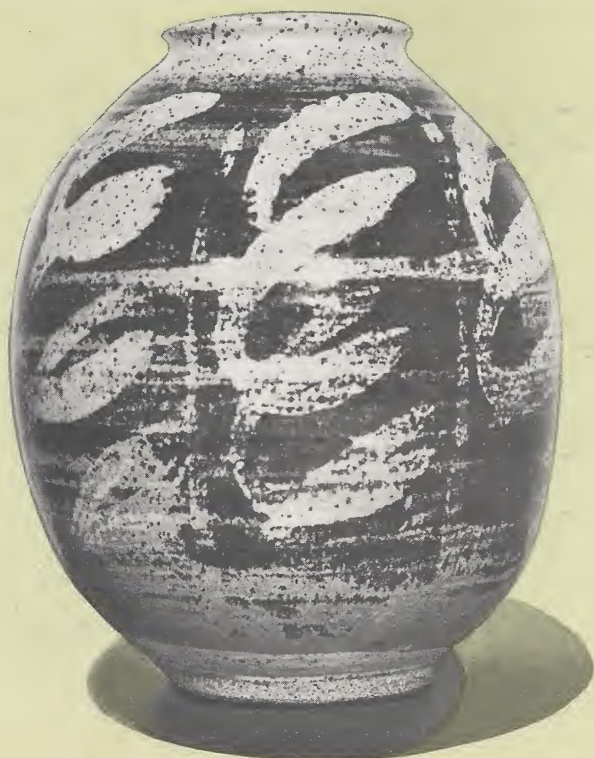
Wax emulsion is a colloidal suspension of a special soft wax and water. Designs brushed on leather-hard or dry greenware with this milky, fast drying emulsion will resist a thin coat of contrasting colored engobe. The lustrous wax masks the clay, and prevents thin engobes from adhering. Wax may be tinted with India ink. Both wax and ink burn out during bisque firing, exposing the original body color.

Bamboo brushes, which taper to a fine point, are traditional for painting wax. Graceful motifs can be treated with a few simple strokes. The bristles can be washed with soap and water.

Very little wax is necessary. Too liberal an application will deposit little white beads on the surface. The design should

resist each thin coat of engobe. Thick engobes may encrust the wax permanently, or produce rough outlines. Brushing over the design with water will remove excess slip which obscures details. Small particles which cling to the design may be brushed away after firing, or retained for texture under a coat of glaze.

Multicolored decoration is easily achieved by this reserved wax method: The wax resist design is covered with a colored slip. Then, sections of the colored slip are reserved by painting them with wax prior to applying a different color of slip. This process can be repeated a number of times. Lines are sometimes cut through the wax and filled with additional colors to produce neat inlays.



Wheel-thrown Stoneware Pot 10". Wax resist with iron slip. After bisque firing, celadon glaze was sprayed over-all. Jayne Van Alstyne, Oak Park, Michigan. Award, 18th Ceramic National.

"Bullfight." Black engobe sponged over wax design on damp bottle. After bisque firing, a spray coat of nearly opaque celadon glaze muted the engobe color for a low key contrast. Cecil G. Strawn, Jr.





SGRAFFITO

with Slips and Engobes

IT SEEMS NATURAL to scratch or cut designs through engobes which have been applied over clays of contrasting color. The Italians named this popular technique "sgraffito," which means scratched through.

Basic Sgraffito Method:

1. The clay form should be leather-hard. Cover it wholly or partially with one or more contrasting colored engobes by brushing, dipping, pouring or spraying.
2. When the surface is firm, scratch, scrape, gouge or engrave designs through the engobe to expose portions of the body clay. Lines and areas of varying widths add design interest. Sgraffito or loop-end tools are favorite implements.



Above: Sgraffito on Stoneware Clay. Three examples by Cecil G. Strawn Jr., Northern Illinois State College, DeKalb. Several colored engobes were used. Speckled semi-matt glazes were sprayed over the bisque. Heavy glaze applications over light colored engobes caused some of the sgraffito designs to look muted and soft. Thin glaze applications over dark slip provided the greatest contrast.

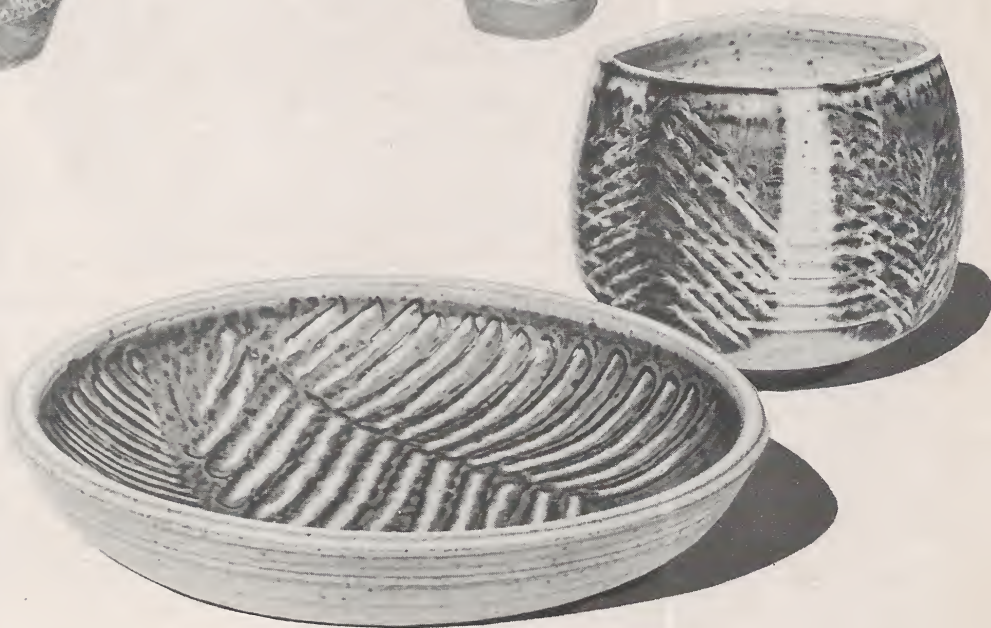
Right: Covered Jar. F. Carlton Ball and Aaron Bohrod. Dark engobe sponged over-all. Sgraffito in cuneiform pattern.





Ebony Horse 24" x 19". Anne Chapman, Cleveland, Ohio. First prize for sculpture, 17th Ceramic National, Syracuse Museum of Fine Arts. Black engobe over blue-green engobe on clay mixed with grog. Sgraffito with varying pressure through to either blue-green engobe or clay body. The excellent design variations add whimsy to the strong basic structure. No glaze was added. Sculptors often favor the dull matt finish of bisque fired clay.

Stoneware Plate 11½" x 2" and Bowl 5¾" x 5¼". Charles Lakofsky, Bowling Green State University, Ohio. Prize, 17th Ceramic National. Blue slip was brushed on immediately after throwing, and scratched with a blunt wood tool, allowing wet slip and body to mingle. After bisque firing, bowl was dipped and plate sprayed with white matt glaze.



TRAILING

Slips and Engobes

FLUID SLIPS can be trailed freely on moist or leather-hard clay. The density of the slip determines whether the design will run, lie flat, or form a thick relief. A mixture resembling thick cream will flatten out when the object is jarred slightly after trailing. Very thick slips remain raised. These "tubing pastes" are mainly useful as ornament on large vases, lamp bases, plaques, and similar objects.

Strain the slip several times before funneling it into a plastic squeeze bottle. Practice trailing on a glazed tile first to check the consistency and to get the feel of trailing. Hold trailer close to the surface. The experiments can be scooped up and reused.

Upper left. Jar. Slip trailed. Peter H. Voulkos, Los Angeles County Art Institute. American Craftsmen Invitational, University of Illinois at Urbana. Heavy relief designs were trailed with thick slip on the damp form. Dark matt glaze was sprayed over-all following a bisque firing.

(John Feree photo courtesy University of Illinois)

Jar and deep plates. Wheel-thrown buff stoneware by F. Carlton Ball. Slip trailed decoration by Aaron Bohrod.

Jar was trailed informally with several colors of slip. Neck was glazed with white matt.

Fishes were trailed on plate with dark slip. After bisque firing, they were inlaid with white gloss glaze. Background was brushed with dark gloss glaze and a colored transparent was sprayed lightly over-all. Raised slip outlines prevented blurring of dark and light glazes.

Pelican shape and background fish net pattern are sgraffito in brown engobe. Trailed outline was added last. Transparent green glaze.

Vase. Buff clay. Antonio Prieto, Mills College, Oakland, California. Sides were squared immediately after throwing. Panels were masked with paper, and blue slip was sprayed over-all. Jagged bands were then trailed with white slip. The bisque was sprayed thinly with speckled gloss glaze.

John Herron Art Museum, Indianapolis.

COMBING AND MARBLEIZING The English and Pennsylvania German folk potters are well remembered for their "combed slipware" plates and bowls. Materials for combing are simple and few.

Basic Slip Combing Method.

1. Strain two or three colors of creamy slip before proceeding. All slips should be the same consistency! Funnel part of each color into a plastic slip-trailer or toy balloon attached to a medicine dropper with a rubber band. Strained slips remain workable indefinitely when trailers are tightly capped.

2. Roll out a $\frac{3}{8}$ " thick clay slab on a heavily waxed paper between rulers or lath strips of identical thickness. The non-absorbent backing prevents fast drying from beneath.

3. Pour contrasting slip over slab. Tip and turn slab until well covered, then pour back excess.

4. Trail a simple design immediately with one or more colors.

5. Exaggerate the design by skimming the glistening surface lightly with a brush or feather tip, or a comb from which many teeth have been removed. For a marbled effect, trailed slabs can be tipped and bent until the fluid colors distort and mingle. Overdoing this stunt causes designs to appear confused.

6. Jar completed slab moderately to smooth the uneven liquid surface. (Now proceed to cover and trail next slab.)

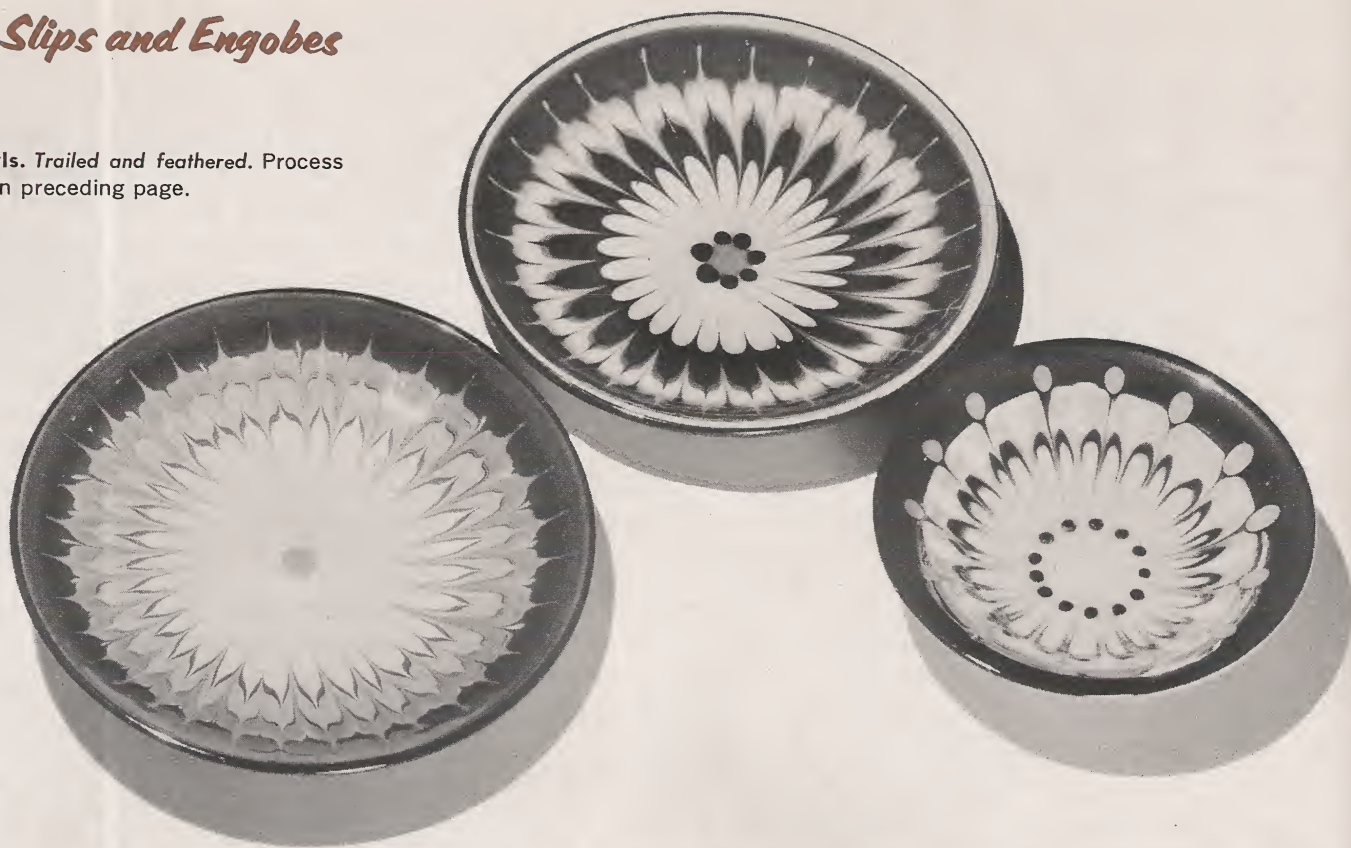
When the slip loses its shine, select the best design area and drape it face down over a bisque or plaster hump mold. Shape the slab to the hump by patting and smoothing it gently. Then slice off excess clay which overhangs the mold. Remove the form as soon as it will hold its shape. Trim and fettle when leather-hard.

Earthenware Salad Plates. Black, white, and blue combed slips on Indian Red Clay. Molded on bisque fired hump-molds. After a Cone 08 bisque firing, leadless Amaco transparent F-Series glaze was poured over them and fired to Cone 05.

Slipware Bowls. *Trailed and feathered.* Kahlers of Nestved, Denmark. (Illustrated next page). The bottom side of each jiggered buff clay bowl was brushed with white slip. A few dark blue bands were trailed around each foot and lip. Then each bowl was centered on a wheel while very damp. Thick slip in five colors—dark blue, green, white, black and red brown or gray—were trailed rapidly in bands. Widths were controlled by varying both speed of application and wheel speed. Bands were skimmed immediately from edge to center with a goose quill. To achieve a pointed petal effect, quill was skimmed in opposite direction through several outer bands. Cover glaze is clear and glossy. *Self-glazing engobes are also excellent for this exciting technique.*

Trailing Slips and Engobes

Slipware Bowls. *Trailed and feathered.* Process is described on preceding page.



INLAY and MISHIMA *with Slips and Engobes*

Any material which is inset into the surface is termed an inlay. Slips, underglazes, clay coils, or glazes may be placed in incised, impressed, sgraffito, or molded lines to produce an inlay.

Effortless Inlay Using Wax Resist

Sgraffito lines can be cut through wax designs on leather-hard clay. The wax will resist a coat of slip or underglaze, but allow the grooves to fill up neatly.

MISHIMA Ancient Oriental Inlay

The ancient Koreans incised delicate designs into their pottery and filled the lines with clay decorating slip of a different color. The excess slip was scraped away when dry, revealing the designs as a sharply defined inlay in the smooth clay surface. When the Japanese started to import this slip inlaid pottery, they called it "mishima," meaning calendar writing, because it reminded them of the script on Japanese almanacs.

Basic Mishima Method:

1. Incise or impress a line design on a leather-hard shape. The lines should be deep and not too fine. Brush away the trimmings.
2. Use a soft brush to stipple slip into the lines. (Self-glazing engobe, liquid underglaze, or glaze are equally successful for this method.) Some lines might be stippled with additional colors. Fill all lines up to the level of the clay.
3. When the piece is dry enough to handle, scrape off excess slip with a flexible steel scraper, revealing the design neatly inlaid. For texture, some areas may be left partially scraped.
4. After bisque firing, transparent or semi-transparent glaze, either clear or colored, may be applied over the mishima.



Brown and White Box. *Mishima.* Twisted cords were impressed into the still moist slab box. Closely spaced lines were incised in bands when the box was leather-hard. Then white slip was stippled into all impressed and incised depressions. When the slip appeared dry, the excess was scraped from the surface with a flat knife. Neatly inlaid white mishima designs remained. The low fire brown clay was fired to maturity without glaze. Made in Italy.

Large Mishima Bowl. Wheel-thrown brown stoneware. Abstract ivory slip inlay. Semi-transparent, semi-matt, glaze over-all. Edwin and Mary Scheier. Prize, 11th Ceramic National.

Accent on Form. 18¾" wheel-thrown sculpture. Aaron Bohrod and F. Carlton Ball. Red slip was sponged into the deeply incised lines. Excess was wiped from the surface with a clean, wet sponge, leaving a reddish tint on the buff clay. After bisque firing, Amaco gray-blue transparent matt glaze was sprayed over the form. Cone 06.



Top left: Vase. Olive green, white, and black. Black slip-glaze was sprayed first. Design was scraped through to the raw clay, following a penciled outline. Exposed area was then inlaid with white slip, using a small brush. Finally, white glaze was applied to the inlaid area. Irene Kolodziej, University of Missouri, Columbia. Prize, 12th Ceramic National.

Top right: Covered Jar. Decorated at bisque stage. Black and blue slip-glaze bands were brushed on. A leather tool served as a sgraffito implement. White matt glaze was sprayed over-all. Abe Cohn, Cohn's Ceramic Makeshop, Milwaukee. Prize, 36th Wisconsin Designer-Craftsmen Show.

Panel: Four wheel-thrown examples showing various uses of self-glazing engobes. All decoration was completed on either leather-hard or dry clay, and single fired to Cone 06. Justin Brady, American Art Clay Company.

Stenciled Vase. Light brown base coat sprayed on Indian Red Clay. Softly blended edges grading to a hard line were created by spraying black self-glazing engobe against a paper strip held slightly away from the vase.

Jar. Low fire white body was given a dipped base coat of white, then decorated with dark brown, light brown, and black "trailed" from a spoon. Transparent butterscotch matt glaze was brushed over the jar when decoration was dry.

Self-glazing engobes are a combination of engobe and glaze, sometimes called slip glazes or vitreous engobes. They are applied much like regular engobes, but become non-flowing, satiny glazes when fired to glaze temperature.

To obtain finished pieces in one firing, cover leather-hard or dry greenware with self-glazing engobe by brushing, dipping, spraying or pouring. Application on bisque is equally successful.

Basic Application Method

1. Add water to powdered self-glazing engobe until mixture is thick and heavy like whipping cream. Strain twice.
2. If object is dry, wipe it generously with a wet sponge just prior to applying engobe. Sponging fills tiny air pores in the surface, allowing engobe to adhere evenly and smoothly.
3. Apply three thick coats, allowing each to dry until firm before proceeding. Do not leave deep pools for they might crack as they dry.
4. For a gloss finish, fire self-glazing engobes to maturity. For a matt finish with only a slight sheen, fire one cone lower.

Sgraffito, trailing and painting are especially effective decorating methods for self-glazing engobes because outlines remain distinct throughout the firing. Clear glaze applied over fired self-glazing engobe gives an appearance of depth, and is recommended for sgraffito decorated pieces.

Self Glazing

BRUSH MODELING

Raised decoration can be "modeled with a brush," using self-glazing engobes (SGE) on leather-hard or dry clay, or bisque of a contrasting color. India ink or pencil, which burn out in the firing, may be used to indicate design areas.

1. Moisten object lightly with a sponge just before brushing a thin coat of creamy SGE over the whole design.
2. Successive layers may be added as soon as the strokes have lost their shine, or applied at a later date. Develop the entire design; do not concentrate on one small section.
3. For a shaded, translucent-to-opaque effect, build up the decoration in very thin coats, covering a little less area each time.



Bottle. Parts of turquoise self-glazing engobe overspray were scraped away to expose a base coat of speckled sand-gray. Accents cut through both layers have revealed the rich red of the bottle itself as part of the design.

Small Buff Clay Bowl. Leaves were painted with pink and dark green on a dipped and poured base coat of sand gray.

Right: Large Bowl. Raised motifs brushed on dark, grogged body. Ann Kucera, Toledo, Ohio. Honorable mention, 35th Annual Exhibition, Toledo Area Artists. (Although Mrs. Kucera used stiff matt glaze, slip or self-glazing engobe could be built up with a brush or trailed to create similar effects.)

Photo courtesy Ceramics Monthly magazine.

for single fire projects!

Engobes

This method closely resembles the old French *pâte sur pâte* technique of brushing delicate white slip designs in graduated layers on gray, green, or brown clay. The French also carved fastidious, cameo-like designs through some of the built-up layers. When fired, the thick, opaque areas appeared as highlights, while the thin, translucent areas were delicate shadows.

Modern raised decoration is usually thickly modeled, opaque, and not shaded or carved. Several colors are customary.

Clay slips are also suitable for this rapid method. A wet clay shape is best. Do not allow the shape to become dry until modeling is completed. This decoration should be bisque fired. If a glaze covering is desired, add a thin coat of clear transparent.

4. When fired to maturity, raised SGE decoration will have a satiny finish in contrast to the dull bisque.



Top: Stoneware Vase. Raised decoration. Maija Grotell, Cranbrook Academy of Art, Bloomfield Hills, Michigan. Prize, 11th Ceramic National. White slip built up thickly with a brush in the modern manner on wheel-thrown brown clay.



Mythical Fishes. Fine Art semi-moist underglaze silk screened through waterproof film stencils. Mixtures of black and gray (from commercial size jars) were screened on a damp bisque tile. Clear glaze was sprayed on dry tile and fired to Cone 05. John Delaplane, Indianapolis.

Fish Composition. Fanciful multicolored semi-moist underglaze brushwork on damp bisque tile. Bob Ochs, Indianapolis. Prize, Second Biennial Indiana Ceramic Exhibition,
John Herron Art Museum, Indianapolis.

Llama. Aaron Bohrod and F. Carlton Ball. Pastel speckled high fire matt glaze was applied to low fired buff bisque, then brushed with black underglaze. Refired to Cone 5.

Flared Bowl. Black semi-moist underglaze air-brushed on white porcelain bisque. Clear high fire glaze spray coat, fired to Cone 5. Bird was stroked with a long bristle French quill brush. Justin Brady, American Art Clay Company.

Small Earthenware Bowl. Semi-moist underglazes brushed on white clay. Loris L. Suite, Washington, D. C. Award, Washington Kiln Club. Dark blue



UNDERGLAZES

was brushed full strength inside the leather-hard shape, then copiously diluted for the pale background tint on the outside. Purple, black, and light blue were used for the buildings. After a soft bisque firing, shallow sgraffito details were scratched through colors. Bowl was poured and dipped with clear glaze. Cone 06.

Tripod Pot 30". Coil and thrown form was sprayed with white matt glaze. Blue and black underglaze bands were applied with a 5" house painter's brush as the pot rotated slowly on the wheel. Vertical lines were scratched through to unfired glaze with a nail. Cone 6. F. Carlton Ball. 18th Ceramic National.

Underglazes are concentrated ceramic oxide pigments which have been finely ground, calcined and carefully washed; then compounded with special fluxes and modifiers for ease of application and color control. A covering glaze protects decoration against wear. The colors appear most brilliant beneath clear glaze, much like pebbles beneath water. This sleek, easy to clean surface is ideal for dinnerware. All underglaze colors must withstand the solvent action of covering glazes at maturing temperatures. Ready-to-use underglazes are supplied in semi-moist, liquid and crayon form. They are often combined with glazes for highly specialized decorating techniques.



Semi-moist Underglazes

Semi-moist underglaze decorating colors are especially recommended for water color effects. While used extensively for decorating bisque, the brilliant colors are equally versatile on leather-hard or dry clay. Colors are approximately the same before and after firing. All white and pastel bodies contrast well. Red clays produce more subtle, shaded tones.



The numerous colors are available in water color type pans and commercial size jars. Used full strength, the colors are excellent for fine, opaque detail painting and dry-brush accents. Add a little water to obtain a fluid brushing consistency. Dilute generously for transparent water color painting, spraying, and airbrushing. Colors thin down without losing brilliance, and are excellent for background washes and sky tints. Intermix to create many new tones and shades. Combine opaque and transparent effects.

SILK SCREENING Semi-moist underglazes in the commercial size jars are ready for silk screening on dampened bisque. Use waterproof stencils. A sponge and water will clean the screen easily after printing.

COVERING GLAZE Clear transparent gloss glazes intensify underglaze colors. Utilize the dull-surfaced, transparent semi-matts for subdued pastel effects. Colored transparents alter each color to produce unusual hues.

Spraying, dipping, and pouring are safe methods for applying glaze to decorated bisque or greenware. For brush glazing, colors should be "hardened on" decorated bisque by firing to 1000° Fahrenheit; decorated greenware should be bisque fired.



DECORATING ON UNFIRED GLAZE The attractive majolica technique requires colors to be brushed or sprayed on an unfired base coat of white or pastel glaze. Mix a little gum solution into the glaze to assure a firm decorating surface. Blend a small amount of liquid base coat glaze with each underglaze color on a piece of glass and grind fine with a spatula. Several colors are customary. Plan each brush stroke, because an unfortunate mark cannot be erased. Improvise an arm rest to steady movement. Motifs actually fuse with the glaze when fired to glaze maturing temperature.

Liquid Underglazes

Liquid underglazes are ready to brush on moist, dry or bisque fired clay. The opaque colors have remarkable covering power. One or two coats applied with a full laden brush will cover large areas completely and evenly. For delicate water color effects or spraying, dilute limited quantities of color with water. Colors do not change when fired. Blend for additional brilliant hues.

A good bond between color and ware is important. Leather-hard clay possesses the ideal slightly rough, dull, moist surface for smooth application. Dry clay and bisque must be moistened with a saturated sponge immediately before applying color. Wet sponging removes dust, finger marks and shiny spots, and fills surface air pores with moisture. Unless pores are filled, dry ware will absorb all moisture from the medium, causing uneven, excessive deposits or chipping. For a fresh start, remove unsatisfactory applications by scraping or sponging.

Colors dry quickly and can be handled lightly without damage. Glaze can be applied safely by any method when decorated ware is dry or bisque fired. A covering of clear glaze increases color brilliance.



Teapot. Ernie Kim. Award for Form, Association of San Francisco Potters, M. H. De Young Memorial Museum, San Francisco. *Brush decoration on buff clay.* Matt glaze covering. A type of design easily adapted to stencil technique.

Hump-molded Freeform. Justin Brady, American Art Clay Co. Background is a mixture of blue-green and black brushed over leather-hard Indian Red clay. Aqua fish was brushed over background, then dry-brushed with diluted brown. Deft black and white details were added. Clear glaze was brushed over the form. Cone 06.

Stoneware Rice Bowl. Justin Brady. Light and dark blue were applied to buff bisque with a pen and pointed brush. Transparent high-fire glaze covering was brushed on. Cone 5.

Jar. Edgar Littlefield, Ohio State University, Columbus. White talc clay brushed with Amaco mahogany brown L-UG. Canary yellow matt glaze spray coat caused motifs to appear gray-brown.

Earthenware Albarello. Edgar Littlefield. Mahogany brown bands were brushed over white low fire clay shape before it was removed from wheel. Transparent light yellow majolica glaze was poured inside, sprayed outside. Cone 05.



L-UG *

PAINTING AND WAX RESIST

Because of their opacity, liquid underglazes are especially valuable for brushing designs on colored clays. To achieve greater spontaneity, choose brushes of the right shape for each design. Simple, vigorous strokes applied with a fully laden brush are most expressive. For shading, moisten one side of the bristles with water or a second color. Sgraffito lines may be added when brushwork is dry to touch.

Wax resist designs are actually free-brush stencils. Apply wax full strength on damp surfaces; dilute it for brushwork on dry clay or bisque, underglaze or slip base coats. Only a thin coat of contrasting liquid underglaze is needed to add an attractive background. For mottled or striated texture, retain some of the basic color by sponging, spraying or brushing thin underglaze sparingly over the form.



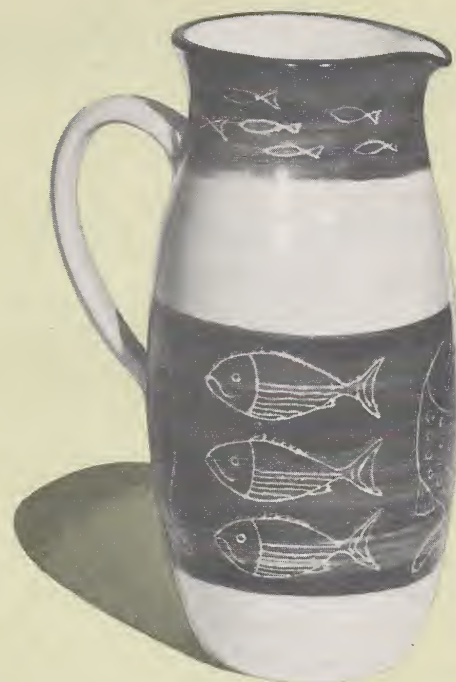
Porcelain Vase. Aaron Bohrod and F. Carlton Ball. Illemanite was wedged into Amaco Porcelain for specks. Fish were brushed with wax on dry pot. Details were scratched through wax. Brown underglaze was sponged over pot, sticking to all bare clay areas. When a Cone 07 bisque firing had removed wax, Amaco clear high fire glaze was sprayed over pot and fired to Cone 5. The tiny specks in the body lend a delicate texture beneath the glaze.

Wide Bowl 8½" x 4". Wax resist with L-UG. Edgar Littlefield. Bright yellow was brushed on white talc clay immediately after trimming. Wax designs were stroked next. Then mahogany brown was brushed on in bands, exposing wax designs. Bisque firing removed wax. A spray coat of Chinese yellow majolica glaze was added. Cone 05.

Shallow Bowl 10½" x 2¾". Edgar Littlefield. Portions of leather-hard white low fire clay form were reserved with wax. Medium blue L-UG was brushed over center area as bowl revolved. Bird pattern was incised through wax, then filled with black to create a neat inlay. After bisque firing, transparent, special turquoise majolica glaze was sprayed over-all. Cone 06.

SGRAFFITO with L-UG*

For a sgraffito base coat, cover any leather-hard clay surface with a thin layer of strongly contrasting liquid underglaze color. The concentrated color tends to dry faster than engobe. When the surface is dull and firm, scratch, scrape, or cut designs through the underglaze to expose portions of the body clay. Use a thin, blunt instrument, steel loop-tool or knife. If colors smear, surface is too moist. Brush away loose crumbs. Parts of the exposed areas can be inlaid with additional colors. Whenever a modified, nonglossy effect is sought, the intense hues can be veiled with transparent matt or semi-matt glaze.



Stoneware Pitcher. Sgraffito. F. Carlton Ball. Dark blue L-UG was sponged onto the buff clay form while it was still on the throwing wheel, giving the bands a softly blended quality. Handle was attached when clay was leather-hard and designs were scratched through bands with a blunt-pointed instrument. After bisque firing, pitcher was sprayed with Amaco light blue high fire glaze. Cone 5.



Bas-relief Tile Panel. Modeled, impressed and sgraffito decoration. Doris Vasek, Morton High School, Cicero, Illinois. Award, 28th National Scholastic Exhibition. Liquid underglazes were used as opaques, tints, and blends to paint the leather-hard tiles. Sgraffito details were scraped and carved through the colors with a small blunt knife and a U-shaped sgraffito tool. Dry tiles were brushed with clear gloss glaze. Fired sections were pressed into tile cement on a tempered masonite backing, mounted in a rigid wrought iron frame.

Buff Stoneware Covered Jar. F. Carlton Ball. Black L-UG was sponged over both wheel-thrown pieces; then sgraffito pattern was scratched into the leather-hard surface. After bisque firing, clear high fire glaze was sprayed over-all and fired to Cone 5.

Tall Earthenware Vase. Shirley Warden, Glendale Senior High School, California. Award, 28th National Scholastic Exhibit. Crude black stripes were painted on the thick terra cotta form after turning. Skeletal fish were then gouged deeply into the leather-hard clay with a steel loop-tool. Glossy white glaze was poured over inside.



STENCILING with L-UG*

Strikingly original liquid underglaze stencil work can be produced using such everyday objects to mask the surface as torn paper toweling, paper strips and cutouts fashioned with a stencil knife or scissors, pieces of wood or metal, even onion sacking or string. Left over cutouts are useful for silhouette effects. If sharp outlines are planned, moisten stencils for good contact. Colors can be dry-brushed, sponged, spattered or sprayed around the stencils in numerous ways. Overlap stencil designs for superimposed color effects. Remove stencils while decoration is still damp or they will stick. Use a pin to lift edges. Free brush strokes add design emphasis.

Large Bowl. Sprayed Stenciling. Loretta Fillar, Lincoln High School, Cleveland, Ohio. Award, 25th National Scholastic Exhibition. Stencils were held about an inch above the red bisque during spraying to create softly blended color edges, rather than sharp outlines. Thin turquoise opalescent glaze spray coat.



MISHIMA with L-UG*

Deep, delicately incised or imprinted linear designs in leather-hard clay can be inlaid easily with bright liquid underglaze colors using the mishima technique described on page twenty. The quick drying colors are soon ready to scrape clean. Try sponging liquid underglaze colors into finely engraved lines on dampened bisque. Remove excess color by wiping entire form with a well rinsed sponge. Tiny color particles which catch in the surface pores lend an interesting tinge to the body hue.

Slab-built Pitcher. Mishima and brushed decoration with L-UG. Lois Culver, American Art Clay Company. Best in Show Award, 1956 Indiana State Fair. Clean-cut deep lines were incised when the Indian Red clay was leather-hard. White and black L-UG were stippled into the lines. When the pitcher was dry, excess L-UG was scraped off with a flexible steel scraper. The mishima ornamentation appeared neatly inlaid. Several solid areas were then brushed with black. After bisque firing, black opalescent glaze was poured inside. For textural contrast, outside was not glazed.



Jar with Lid. Mishima with L-UG. Lois Culver. When leather-hard, wheel-thrown white talc clay was incised with a stencil knife. Mahogany brown L-UG was stippled into the depressions until they were amply filled. When the body was dry, mishima details were scraped smooth. After bisque firing, transparent amber gloss glaze was poured inside jar and brushed inside lid. Transparent robin egg blue matt glaze was brushed over outer surface. Cone 06.

Stoneware Bottle. F. Carlton Ball. Thread-like, freely incised lines in the buff bisque were inlaid by sponging liberally with brown underglaze. Most of the excess was removed with a well-rinsed sponge as pot rotated. Interior was coated with clear glaze. Cone 5.



Underglaze Crayons

Underglaze crayons are produced under expertly controlled manufacturing conditions. Minute amounts of choice clays are ground intimately with each inorganic underglaze pigment to add strength and body. Bonding mediums and other necessary constituents are added to make the mass plastic temporarily. The nearly dry mixture is then extruded into cylindrical form under pressure and dried.

Underglaze crayons are excellent for sketching on either moist or dry bisque. For dense color applications, wet the bisque first to provide a rough surface "tooth." For subtle pastel effects, sketch directly on dry bisque or a completely dry background of liquid or semi-moist underglaze color. Blend and shade with the fingers or cotton tipped swabs. Create water color effects by intermingling colors with a moist brush or sponge. For thin lines, pare crayons with a knife. Mix left over scraps with water for brushing or spraying on bisque or greenware.

Clear or transparent covering glazes may be sprayed over underglaze crayon decoration. Before glazing by any other method, spray decoration with a fixative composed of one part gum solution to five parts water. When dry, fixative coat prevents loose particles from being swept out of place.



Vase 12". Wheel-thrown. Blue and black Amaco underglaze crayon sketched on white talc bisque. Spray coat of Amaco clear majolica gloss glaze. Cone 05. Edgar Littlefield.

Plate 8" diameter. Primeval bison drawn with brown, yellow and black underglaze crayons on white commercial bisque plate. Clear glaze sprayed over form. Pat Peat Dusendschon, Indianapolis.



Tile 4¼". Many colors were used to sketch the Trojan Horse on dampened white bisque. Colors were blended with a moist brush, then fine lines were scratched through into the bisque with a sharp pointed object. When dry, the decorated surface was sprayed with clear glaze. Cecil G. Strawn, Jr.



SKETCHING ON UNFIRED GLAZE

Underglaze crayons are especially suitable for drawing on a base coat of unfired, nonflowing glaze. To render the base coat firm and hard to withstand crayon pressure, blend one measure of gum solution into three measures of dry glaze. Then mix in water until the glaze is right for application. Adding a tablespoonful of Karo sirup to a liquid quart of regular glaze is another way to prepare a base coat. Regular glaze applications can be strengthened with an overspray of diluted gum solution.

Bird Pitcher 10" x 12" and Teapot 9½" x 5". Wheel-thrown buff stoneware by F. Carlton Ball. *Amaco underglaze crayon decoration on dry, unfired glaze.* The bird is actually a bottle, bent and shaped while the clay was plastic. An inverted bowl forms the base. Structural details were added, then carved slightly. When bisque fired, bird and teapot were sprayed with base coats of white matt high fire glaze fortified with Karo sirup. Bird's back and wings received an overspray of rust brown matt. Blue, yellow, brown, turquoise and black crayons were rubbed into the dry glaze like delicate pastels. Only blue and turquoise crayons were used to sketch the meander motif on the teapot. Both colors were blended in with the fingers for softer tones. Cone 5 glaze firing.

GLAZES

Glaze is a thin coating of glass which fuses to the surface of a clay body during firing. It provides strength and beauty, imperviousness to moisture and dirt, decorative textures and permanent colors, and a cover for underglaze decoration.

Glazes may be **opaque**, **translucent**, or **transparent**; they may be **colored** or **colorless**. Dazzling hues are typical of low fire glazes. High fire glaze colors are characteristically subdued owing to the modifying effects of high temperatures.

In addition, glaze surfaces have a wide range; from **glossy** to **matt**. They may be curiously **speckled** or **textured** as well. Most transparent glazes are of the light-reflecting glossy type, but there are a few excellent transparent satin-matts.

GLAZE HINTS Satisfactory results depend upon familiarity with the working qualities of each material. Test each glaze on both flat and vertical surfaces and on white and colored clays or slips. According to your needs, fire additional tests showing how each glaze looks when applied thick or thin over underglaze colors, sunken lines and over or under other colored glazes. Select glazes to suit the size, shape, decoration and use of each object from your fired tests.

Brilliant, glossy glazes have a hard, jewel-like quality on small pieces. Dull, matt textures reflect less light, are preferred on large forms.

Light colored gloss glazes are often selected for container interiors because they look fresh and are easy to clean.

Gloss glazes enhance the translucency of thin porcelains. Both matt and gloss glazes are appropriate for earthenware and stoneware.

Glazes of similar texture can be applied over each other to good advantage, as matt over semi-matt or opalescent over majolica. One glaze color applied thinly over another produces a much livelier effect than a mixture. Matt and gloss glazes are apt to cause an undesirable (matt-shine) effect if applied over each other. It would be better to confine these opposite textures to separate areas.

High fire glazes are formulated for use on stoneware and porcelain bodies only. A low temperature bisque firing is preferred before glazing. The strengthened ware is easier to handle and the fired appearance of the glaze is improved. However, both stoneware and porcelain bodies can be bisque fired to maturity, then glost fired with lower temperature glaze. High fire glazes are sometimes applied carefully to the bone dry greenware, then single fired to maturity.



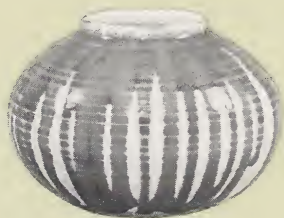
Bottle. Oversprayed glazes. Lois Culver, Indianapolis. A turquoise opalescent base coat was sprayed on Indian Red bisque. Oversprays were white opalescent at shoulder and black opalescent at neck. Cone 04 slow firing.

Stoneware Vase showing good use of matt and gloss glazes on the same piece. Bonnie Staffell, Maumee, Ohio. First Award in Ceramics (for a group) 35th Annual Exhibition, Toledo Area Artists. White slip sgraffito sea life design on gray slip ground. Gray matt glaze sprayed over sgraffito area. White glossy glaze applied over interior and foot.



The Juggler 10" x 8" x 20". Terra cotta facade sculpture. Colored glazes provide gaiety as well as protection from the elements. Thelma Frazier Winter, Cleveland, Ohio. Top prize for Ceramic Sculpture, 14th Ceramic National.

Small Jar. *Trailed gloss glaze.* Lois Culver. To create a better trailing surface, the white talc bisque form was briefly immersed in water. Then glossy white glaze was swished around interior. Trailer containing Amaco Chinese red F-Series glaze was touched to lip at intervals and squeezed gently until a stripe ran halfway down the side. Cone 06 firing caused most of the thickly trailed stripes to extend to base.



Shallow Bowl 14 1/4" diameter. Black matt inlay surrounded by thick white gloss glaze. Yellow engobe base coat is evident where glazes join. Heavily grogged buff stoneware body was not glazed on underside. Richard Kjaergaard, Kas-trup, Denmark. "Design in Scandinavia" touring exhibition.

APPLICATION AND PREPARATION

Glazing is a simple process which requires practice and care. The usual glaze application methods are: dipping, pouring, spraying and brushing. Spraying affords the most even coverage. The user can best determine which method suits his particular needs.

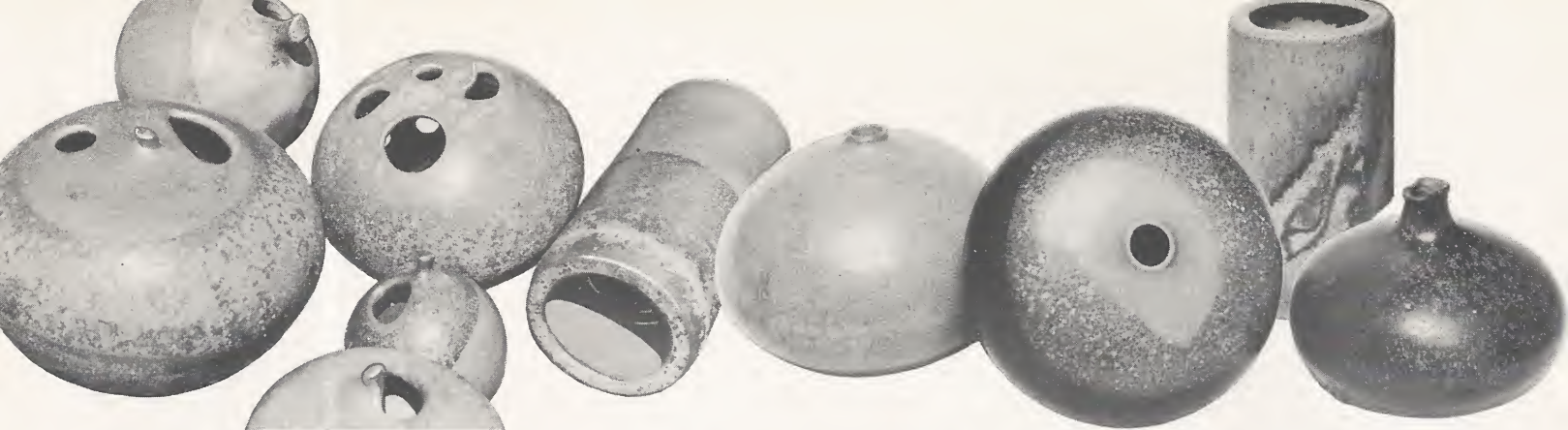
In general, glaze mixtures for spraying and brushing should be like medium thick cream, while mixtures for dipping and pouring may be thinner. Vary the amount of water in the glaze to suit the porosity of the ware. Porous bodies require thin glaze applications or the surface will absorb too much glaze. To reduce absorption on porous bisque, dampen it slightly just before applying glaze. Thicker glaze mixtures are required for surfaces of low absorbency, such as bisque fired to the maturing temperature of the clay.

Unfired ware requires special handling and longer drying periods between glaze coats. If too much water is absorbed, the body will resoften, even collapse. Bisque is stronger, and will not resoften.

Spraying is the best method for reglazing fired ware. Warm object in an oven until almost too hot to touch, then spray thin glaze (containing gum) over it. Thicker glaze can be applied when first coat is dry. Total application should be thin for successful firing.

PREPARED GLAZES Each batch of glaze prepared by a dependable factory has been compounded and tested by experts to insure reliability of color, texture, and fitting and firing qualities. *Homogenized liquid glazes* are ready to use and are especially valuable for classroom use when time is at a premium. They usually contain sufficient gum. *Dry glazes* are economical, and may be stored for indefinite periods. A mortar and pestle are helpful for mixing and grinding the powder intimately with water. Gum solution may be added to brushing mixtures as required. Work the creamy mixture through a fine sieve to prevent lumps.





BASIC GLAZING TECHNIQUES

SPRAYING

The spray gun is highly valued for applying a uniform base coat of glaze or a glaze covering for decoration, but is often overlooked as a decorating tool. The spray can be directed freely over the form to create bands, stripes, or airy patterns. Small amounts of contrasting colored glazes sprayed one at a time at lip, foot, or over important contours will accentuate the form's basic beauty.

Mottled, gradated, drenched or finely dispersed effects are possible by varying the consistency, distance, angle and pressure of the spray. For spattered or splotted textures, a toothbrush and knife may be preferable tools. A damp base coat will soften the texture of an overspray more than a dry base coat. Longer firing near maturing temperature tends to fuse the colors deeply into the surface.

STENCILING. Adhere torn or cut pieces of Japanese paper to the base coat with a wet brush. Then spray or pour a contrasting glaze over it. More stencils can be adhered and the process repeated. Remove superimposed layers of glaze covered paper before firing.

BRUSHING

Glazes of similar composition can be brushed over or next to each other to create charming, softly blended textures. Full, broad strokes are best, because the subtle fusion of the glazes during firing would obliterate any finicky details. To avoid excessive distortion of glazes which have a tendency to flow, keep applications medium thin and confine them to horizontal surfaces.

Group of Stoneware Vases. Fong Chow, Far East Department, Metropolitan Museum of Art. *Dipped, trickled, dripped and poured glazes.* Chow selected the most spontaneous techniques to encourage the glaze decoration to "work on the form."

Two Stoneware Jars. *Trailed glazes.* F. Carlton Ball.

Left: Opaque white glaze was poured inside red bisque form, then trailed in stripes outside. Cone 4. Red and white effect.

Right: Pale green glossy glaze was poured inside buff bisque. Patterns were trailed heavily outside with same viscous glaze.

TRAILING

Matt and gloss glazes which flow very little at maturity are preferred for trailing. Opaque gloss enamel glazes provide a rich contrast when trailed directly on dampened bisque. Too thick designs will distort excessively during firing. Wipe them off and start again or shave high spots. A similar glaze of contrasting color is often sprayed thinly over the decorated form to seal the surface. For a less diffused effect, the glaze could be applied first as a contrasting base coat. Trail design when base coat is nearly dry. Concentric circles or pinwheels can be trailed very simply while the form rotates slowly on a wheel.



POURING AND DIPPING

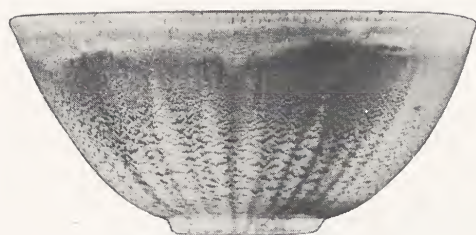
Poured or dipped glaze applications are liked by studio potters because the appearance is less mechanical than sprayed glaze and no special equipment is required. Pouring is convenient for interiors.

For informal patterns, pour, drip or splash thin glazes over a dampened object. Tip or rotate the form to influence the direction of the flow. Deliberately overlap layers to cultivate varying color and tonal effects. Uninspired patterns can be washed off for another try.

The whole object or parts of it may be dipped in one or more thin glazes with striking results. Unfired bodies tend to resoften as they absorb moisture, therefore avoid excessive or prolonged wetting.



Stoneware Chalice. *Poured glazes.* The narrow foot was thrown directly on an inverted bowl. Black matt glaze was thinned considerably with water and gum, then poured over the piece and encouraged to follow the form naturally. Tonal effects varied with the thickness of the overlapping portions. A cover coat of semi-opaque yellow matt glaze was added. Rudolph Staffell, Temple University, Philadelphia.



Deep Bowl. *Wheel-thrown.* Glossy white enamel glaze sprayed inside, glossy textured green outside. Glossy black glaze oversprayed very heavily and evenly at top outer edge. During firing, the excess black glaze ran down the surface of the green base coat, forming delicate stripes. Lois Culver.



Flat Earthenware Dish 12" sq. Slab built of white clay. Birger Kaipiainen, Arabia, Finland. Blue-green background and figures were sketched with opaque underglazes. Opaque mauve, Nile green and grayed lavender gloss glazes were then brushed thinly over portions of the figures to enrich the texture. Transparent cover-glaze. John Herron Art Museum. Indianapolis.



Hand-Built Bottle and Wheel-Thrown Vase. Brown slip under gray matt glaze. *Both slip and glaze poured.* Matt hues contrast softly with unglazed portions of the neutral stoneware body. Karl Martz, Indiana University, Bloomington. First Award, Second Biennial Indiana Ceramic Exhibit, John Herron Art Museum.



Flattened Stoneware Bottle 22". Designed for flowers on a narrow shelf. Side spouts were thrown separately. White matt glaze oversprayed with black matt glaze. F. Carlton Ball.



"Bittersweet" 5" x 8". Jar by the late Charles F. Mosgo, Cleveland Institute of Art. Prize, 14th Ceramic National. A colorful overspray of one glaze on another for textural effect.

Basic Glazing Techniques

Traditional Techniques

GLAZE INLAY *Basic Variations*

Carved or impressed grooves or enclosures on the body may be filled with nonflowing gloss or matt glazes or self-glazing engobes. Use a slip trailer or brush to inlay thick glaze. Remove excess by scraping or sponging. When fired, the smooth inlay contrasts well with the dull body.

The bare areas left by sgraffito or rubber resist designs may be inlaid. Several colors will produce a polychrome effect. Occasionally a thin covering of transparent or semi-opaque glaze is applied over the entire design.

"Cloisonne" Glaze pools can be separated by raised partitions on the body. The partitions must be fashioned while the body is still plastic, either by pressing the body over a deeply incised mold, attaching clay coil ridges, or gouging out depressions in the leather-hard form.

On level surfaces, glaze colors can be prevented from intermingling by carving narrow, uniform grooves around each design area. A different colored glaze is then trailed thinly over each "plateau." When glaze is dry, accidental drop-lets must be scraped from grooves.

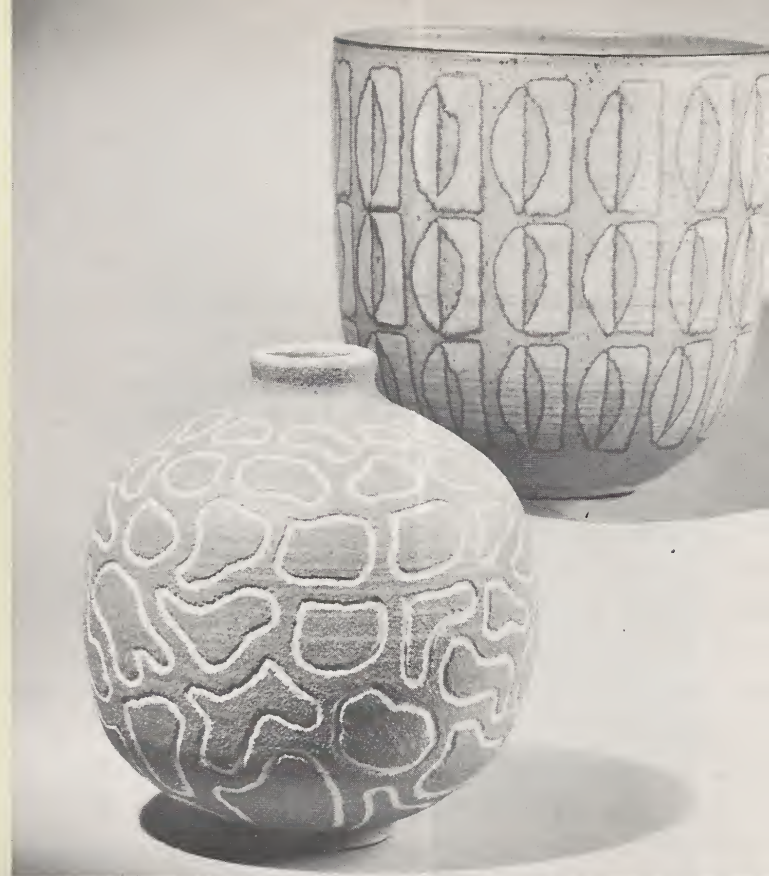
Partitions can also be sketched on a flat surface with dark underglaze. Each glaze color is then applied thinly up to the lines. Extreme care is necessary at all times, or the colors will intermingle.



Left: Tray 21" x 17". Rut Bryk, Wartsila-koncernen AB, Arabia, Helsingfors, Finland. "Design in Scandinavia" touring exhibition. First, a large plaster slab was scraped, incised and excised to produce fanciful motifs surrounded by deeply carved grooves. When a large slab of white clay was pressed over the plaster mold, the deeply carved grooves became ridges or "cloisons," which enclosed each design area. After bisque firing, dark underglaze was sponged thinly over the interior of the 2" deep tray. A different colored transparent glaze was flooded into each enclosure. Several small partitions were filled with opaque pastel glazes. Background was not glazed. After firing, additional fine details from the mold were revealed beneath the glistening, transparent colors.

Jar. Incising inlaid with glaze. F. Carlton Ball. (Amaco buff clay mixed with 25% grog and 3% manganese dioxide to color it brown.) Design was incised in leather-hard form. Amaco white high fire matt was sponged over bisque fired surface. Lines were filled by repeated sponging. Excess was wiped off. Cone 5 glost firing.

Vase. Clyde E. Burt, Melrose, O. Award, South Bend Art Association 4th Annual Regional Ceramic Exhibition. (Iron oxide was mixed into the buff clay flour before moistening.) Pencil guide lines on the dry form were painted with rubber latex, which was pulled off following a spray coat of gray matt glaze. Orange matt was inlaid with a small brush. Dark outlines formed where colors touched.

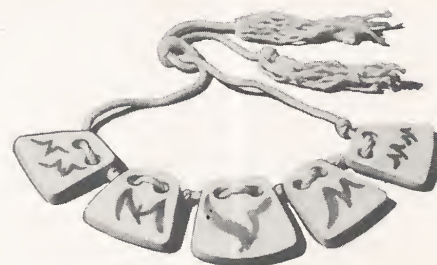


MAJOLICA *named for the island of Majorca*



"HOLY FAMILY." Pierced Altar Tile. *Majolica.* Donald Ricé, South H. S., Denver, Colo. Award, 24th National Scholastic Exhibition. White majolica glaze was brushed into the difficult areas first, then over-all. Maroon and blue underglaze washes were brushed in the depressions and sometimes blended for tonal effects. Heavy outlines were added with black underglaze.

Delft Necklace. Amaco buff clay slab was painted with glossy white high fire glaze and cut when leather-hard. Blue semi-moist underglaze designs were added. Cone 5 single firing.



Probably the best known kind of ceramic decoration, majolica was made famous by the Italians and Spaniards. Specifically, majolica is pottery in which the colored clay body is concealed with an opaque enamel glaze. Light colored slips were originally used to conceal the clay body, but when the Europeans attempted to imitate the decorated white china imported from the Orient, opaque white glossy glaze was soon introduced instead.

Colored glazes of the same glossy type are usually painted over a base coat of unfired opaque white gloss glaze. The decoration is fired at the same time to become a permanent part of the glaze.

A large palette of painting colors can be prepared by mixing a small amount of the basic white or pastel glaze with equal portions of liquid, dry, or semi-moist underglazes. A muffin tin makes a good container.

DELFT *named for a city in Holland*

Buff clay which is covered with opaque white gloss glaze, then freely brushed with cobalt (or blue underglaze) before firing, is traditionally known as delftware.



WAX RESIST

Wax emulsion can be brushed directly on bisque or on a base coat of unfired glaze of the viscous type. The wax design will resist thin coats of contrasting glaze applied over it.

Reserved Wax Wax brushwork and thin applications of variously colored glazes can be alternated until the entire surface is slick with wax. Lines cut through wax can be inlaid with contrasting glaze. Layers of stiff glaze can be built up between wax lines on the bare body. This creates a beaded effect when fired.

Stoneware Bowl 5¼" high. F. Carlton Ball. Amaco glossy white high-fire glaze was mixed with extra gum solution and sprayed over buff bisque. Wax designs were then brushed on the unfired glaze. Amaco rust brown high-fire glaze was sprayed over exterior. Cone 5 glaze firing. Some of the rust glaze adhered to the wax and appears as a spatter texture, giving the bowl its distinctive style.

RUBBER RESIST

Liquid rubber latex can be brushed onto bisque, glazed or dry clay surfaces to create a painted stencil or "frisket." Like wax, latex is a resist, but it can be pulled off as soon as the glaze or other decorating material has been applied. This is a "fun" process with many artistic possibilities.

Latex is especially good for bold designs. The quick-drying application should look slightly opaque when thick enough. Glazes can be applied thick or thin over it. Pull the stretchy latex from the pot as soon as the glaze is set but not dry. The frisket can be removed with one pull if the designs are connected. Several glazes and friskets can be applied over each other and pulled off at the same time.

Do not use good brushes, because latex is often difficult to remove from the bristles. Moisten the bristles with soap before dipping in latex. Wipe all latex from the brush immediately after use, and wash it in a one to three mixture of ammonia and warm water.

Bottle. Rubber resist with matt glazes. Aaron Bohrod and F. Carlton Ball. Wheel-thrown Amaco white porcelain was bisque fired to Cone 07. Latex frisket was brushed on and dried half an hour. Then bottle was sprayed with black matt. Frisket was pulled off, leaving bare body. Next, white matt was sprayed over-all. Cone 6.





SGRAFFITO

Sgraffito is a simple method of decorating that defies rapid mass production because the designs must be scratched through an unfired base coat. In order to preserve details in glaze sgraffito, select a nonflowing glaze. Opaque colors are usual, contrasting strongly with the fired body hue.

Gum solution may be mixed into the glaze to add strength during handling and decorating. Cover the dry greenware or bisque as usual with several smooth coats of glaze. Special rich "fatty" effects need a thicker glaze coat than routine applications require.

Proceed when the glaze coat is firm enough to touch, but not dry. Scratch, scrape or cut broad lines or areas through the glaze with a pointed stick, knife, sgraffito or small loop tool. The exposed parts of the clay or bisque body will be the design. Glaze is apt to heal over finicky details.

If the glaze starts to chip as you sgraffito, it may be too dry. Atomize a small amount of water over the area and resume scratching after a moment. Remove excess glaze from sgraffito areas with a damp brush.

Sgraffito Variations

Speckled Effect: Spray a contrasting colored glaze very lightly over the entire sgraffito surface.

Two Layer Method: Apply a second, contrasting colored glaze over the base coat glaze. Scratch through the top layer of glaze only, exposing portions of the contrasting base coat rather than the body clay. Accents may be scratched through both layers.

Wheel-Thrown Stoneware Albarello. Glaze sgraffito. Lois Culver. The buff bisque was sprayed with a heavy coat of celadon glaze and scratched with a pointed stick. The body remains unglazed where the designs were scratched. Cone 5 firing.

Stoneware Storage Jar. Semi-matt on matt sgraffito. Lois Culver. Beige matt base coat with thick overspray of brown semi-matt for "fatty" effect. Designs were cut through the overspray with a stencil knife, exposing portions of the contrasting base coat as the design. Cone 5.

Collection Dr. and Mrs. Jack Barrow, Saint Louis.

Black and White Stoneware Bowl. Black matt glaze sgraffito. Ernie Kim, California School of Fine Art, San Francisco.



ONGLAZE

Onglaze is a general term for decoration applied directly to unfired glaze and fired at the same time. Majolica and delft are onglaze techniques limited to decoration on a white glaze background.

Any glaze which will not flow readily during firing is suitable for the background. The choice for the decorating medium is large: one can use other glazes or any of the underglazes mixed half and half with glaze. Add a few drops of gum solution for smoother brushing or trailing. If the painted designs seem too harsh, a fine overspray of the base glaze will soften the effect.

To produce a delicate underwater look, paint or spray transparent gloss glazes over a background of light colored opaque gloss glaze.

Opaque gloss glazes have a bold effect when applied in patterns over a colored transparent base coat.



Grazing Goat. Emma Baer, Peabody H.S., Pittsburgh, Pa. Award, 26th National Scholastic Exhibition. Sculptural details were deeply incised in the leather-hard buff clay before natural brown engobe was brushed over-all. After bisque firing, the incising was inlaid with white enamel glaze. A thinner mixture of the same glaze was poured over the animal's back and partially scraped with a wire brush. Clear glaze was brushed over-all.



Plate and Pitcher. Wheel-thrown buff stoneware by F. Carlton Ball. *Onglazing* by Aaron Bohrod. The plate was originally covered with fired black glossy glaze. White matt was sprayed over this, and a bird design was scratched through the damp white coat with a blunt stick. Refiring united the glazes permanently.

Bisque pitcher was sprayed with dark blue matt. Sgraffito design was cut through to expose portions of the bisque. White matt was sprayed thinly over the entire piece before firing.

Traditional Glazing Techniques

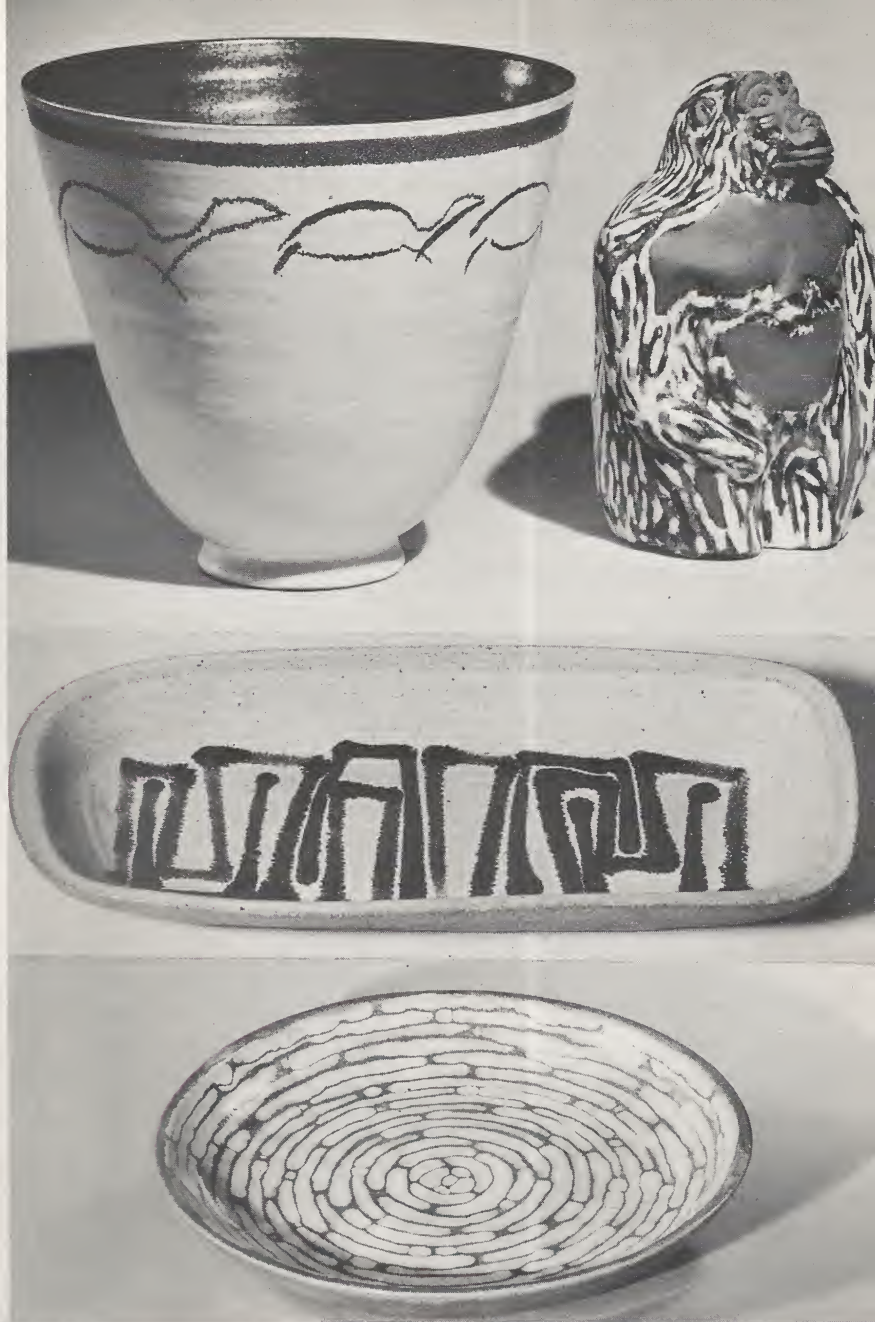
Wheel-Thrown Red Clay Vase 9" W. x 8½" H. David Giorgi, John Marshall H. S., Cleveland, Ohio. Award, 29th National Scholastic Exhibition. Brown matt glaze sprayed inside, white matt outside, on bisque. Band of black matt spray-stenciled near lip outside. Running animal frieze painted with black matt on the unfired white glaze.

Baboon. Partially glazed red clay sculpture. Burt Rosen, West H. S., Denver, Colo. Award, 24th National Scholastic. A thin mixture of black and white enamel glaze was daubed over part of the animal. Thin black enamel was then brushed over all parts which were to receive any glaze. Thick strokes of viscous white enamel were applied last, completing furry appearance.

Stoneware Butter Dish. Gordon Martz, Marshall Studios, Inc., Veedersburg, Indiana. Dark buff clay with grog. Glossy white glaze was brushed over inside only. Brown and black glazes were trailed over it. Single firing.

Shallow Buff Bowl 10⅞" dia. Lou Tanner, Chicago, Ill. A basecoat of glossy, speckled transparent brown glaze was brushed over-all. Then glossy, opaque white glaze was trailed in concentric rings over the transparent basecoat.

John Herron Art Museum, Indianapolis.



Transparent Glaze Suggestions



Modeled Bear. Georgia Blattman, North H. S., Denver, Colorado. Award, 25th National Scholastic. Clear gloss glaze brushed on red bisque. Meandering onglaze pattern is transparent green gloss glaze.

Clear and colored transparent glazes have been used to decorate clays ever since the Egyptians invented glaze. One or two transparent colors are often the sole ornament. Transparent glazes are also important as a cover for slip and underglaze decoration.

Colored transparents change the color of the clay or decoration without obscuring it. New color effects are thus created. Transparent yellow glaze would tint white clay to yellow, yellow clay or decoration to deep gold, red clay to brown, and blue decorations to green.

Transparents are usually applied thinly. They tend to craze, appear cloudy or translucent when application is too thick or underfired. However, thick applications are useful in incised or impressed textures for an illusion of depth. Thick pools of transparent gloss colors in the bottom of a thick dish look like glistening, crazed ice.

Gloss Glaze Suggestions



Double-Neck Jar. Lois Culver. Leather-hard pinch pot and slab terra cotta form was scraped for texture. Amaco black opalescent glaze was poured over inside, smeared into outside texture. Excess was rubbed off with a dry sponge. Cone 05 firing. Smooth black glaze contrasts strongly with rough red terra cotta.

Bottle. Justin Brady. Vertical brush strokes of sapphire blue opalescent glaze on bisque Indian Red body. Cone 05. Slow firing aided texture development. Crystalline texture varies where the thin strokes overlap.



Gloss glazes can be: Flowing or viscous in the fire; transparent, opalescent, translucent, or opaque; and even-colored or mottled, speckled, crystalline, etc. For example, enamel glazes are opaque, viscous and even in color. Most glossy glazes flow enough to cover small defects. Too heavy an application could flow excessively when fired. Glossy glazes are especially easy to clean, and are first choice for ash trays, and food or liquid containers.



Clown. Glaze on glaze. William Hargate, Normandy School, Saint Louis. Award, 26th National Scholastic Exhibition. Glossy metallic brown glaze was brushed on pompoms, lips and ruffle, then inlaid in eyes and wig. Transparent amber glaze was brushed over wig and suit. Dark blue glaze stripes were trailed over glaze on the suit. Buffoon's skin was painted with white matt.

Armadillo 12" long. Brown colored sculpture. *Partial glaze.* Mary Krings Risley, Middletown, Connecticut. Honorable Mention, 17th

Ceramic National. Opaque yellow glaze was painted on the relief carved shell, the eyes, and toenails.

Slab Vase. Jackie Hawkins, Lyons Township H. S., La Grange, Illinois. Award, 29th National Scholastic Exhibition. Brown engobe on white clay, brushed with panels of glossy white glaze. Linear patterns were sketched over engobe and scratched through glaze with a dull pencil. Black underglaze was then painted along lines. The fired white glaze appears pink over the brown slip.

Variegated Glaze Suggestions

All basic application methods are advocated for variety glazes. The alligator and opalescent types are esteemed by the inexperienced glazer because variations in application thickness actually enhance fired results. Exceptional color effects can be produced by experimentally applying glazes of dissimilar composition over each other. A variety of "leopard fur" and bubbled textures result when an opalescent glaze is applied over a base coat of alligator, or vice versa.

Opalescent glazes develop beautiful iridescent textures when applied over red burning clays, dark engobes, or dark underglazes. The slight cloudiness which develops beneath the smooth surface looks like natural opal. The degree of opalescence increases with the thickness of the application, the temperature, and slowness of firing.

Alligator glazes develop a crystallized surface texture which ranges from glossy to crepe matt when used on any clay. Application should be thick. Slow firing and cooling aid development of the crepe texture.

Speckled and mottled glazes have been preground, then mixed with certain coarse, texture-promoting minerals. Draw a wet brush across the unfired speckle glaze to expose the tiny particles for a pronounced speckle effect.

Low fire crackle glazes respond well to a short firing cycle. Crackle patterns can be accentuated by rubbing warm pieces with India ink after firing.

Hump-Molded Freeform. Lois Culver. Indian Red clay was impressed with bisque stamps, then bisque fired. Amaco mottled orange alligator glaze was poured over-all, forming rich pools in depressions. Cone 04.

Modeled Horse. White crackle glaze on white clay. Judith Hanson, Edmund Meany Jr. H. School, Seattle, Washington. Award, 24th National Scholastic Exhibition. Black ink was rubbed into the crevices to emphasize the texture.



Bowl. Patricia Johnson, The Harris School, Chicago. Award, 28th National Scholastic Exhibition. Blue opalescent glaze was sprayed thinly over entire wheel-thrown red form, then sprayed heavily over spiral finger indentations at center. The varying texture of the single rich glaze became the decoration.

Jiggered Bowl. Knowlton Farr, American Art Clay Co. Green alligator glaze was sprayed heavily over inside and edge, followed by a thin spray of white opalescent. During firing, the alligator glaze moved more than the opalescent, causing texture like drifting surf. Cone 04 single firing on Amaco Red Clay.



Floor Vase 31½". *Partly glazed.* Donald J. Siegfried, San Francisco. Prize, 15th Ceramic National. Dramatic use of gun metal matt glaze on wheel-thrown red earthenware.

Giant Bottle 22". *Oversprayed matt glazes.* Don Fahle, San Raphael High School, California. Award, 25th National Scholastic. Form was constructed on wheel with buff slabs. Light green-blue art matt glaze was sprayed over deeply incised designs. Pea green art matt overspray gradates from lip to shoulder.

Shallow Stoneware Bowl. Underglaze designs were brushed on a base coat of unfired semi-matt glaze. A light overspray of the pastel base coat served to diffuse and veil the intense underglaze colors. Noël Waite.

Wide Buff Stoneware Bowl 12" x 3½". *Red and purple satin matts painted in juxtaposition on a background of unfired pale green matt.* Bonnie Staffel, Maumee, Ohio. One of a group of 15 pieces receiving a First Award in Ceramics, 35th Annual Exhibition, Toledo Area Artists. Toledo Museum of Art.

Photo courtesy Ceramics Monthly Magazine.

Wheel-Thrown Stoneware Pitcher and Cups. White semi-matt glaze was dripped from a slip trailer unto dark matt basecoat. Noël Waite.

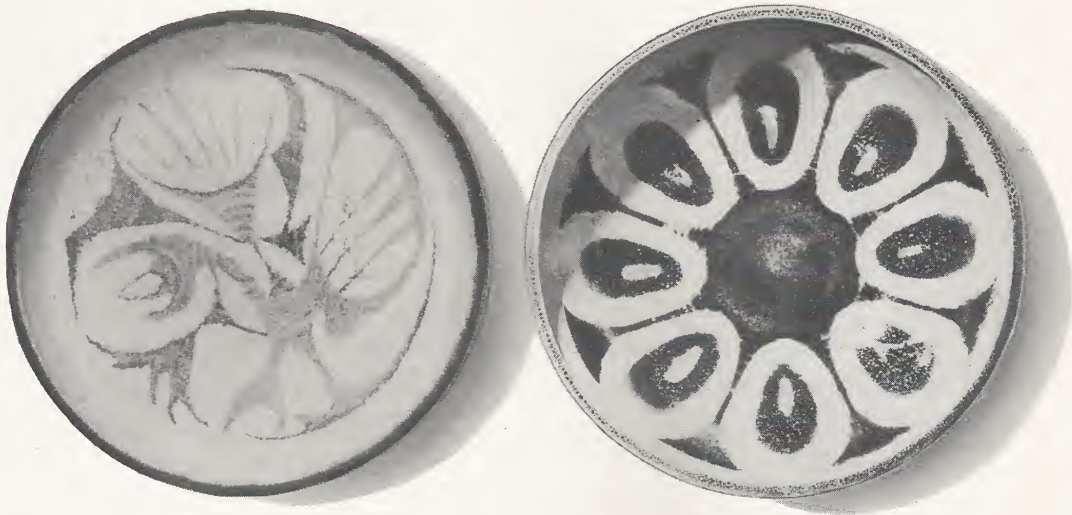
Elongated Bread Server 22" x 3". *Drape molded stoneware. Wax resist glaze decoration.* F. Carlton Ball. Amaco white high fire matt glaze was mixed with extra gum for a very firm surface, then sprayed over buff bisque form. Wax designs were brushed on glaze. Gray high fire glaze was oversprayed thinly on wax area, thickly on all others. Cone 5.

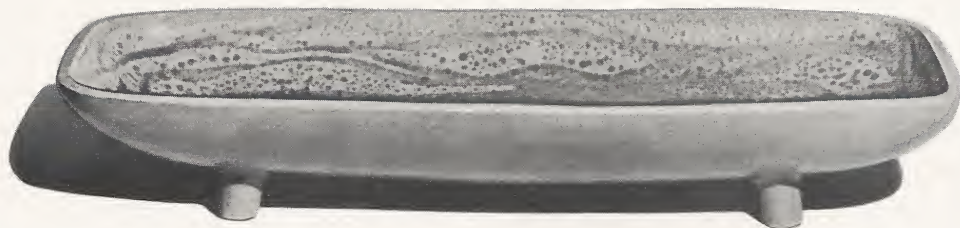
Large Wheel-Thrown Vase. Engobe stripes were painted on bisque with a flat brush. Alternate lines were printed with Barnard clay slip, using edge of rigid steel scraper. Criss-crosses were scratched in last. Ornamentation shows clearly beneath brush coat of semi-matt glaze. Harvey Littleton, University of Wisconsin. Prize, 18th Ceramic National.

Bottle. Poured Glaze. Justin Brady. Thrown shape pressed into a freeform when wet. Tri-cornered base carved when clay was stiff. Spray coat of oatmeal matt high fire glaze was followed by a slight overspray of textured green matt. The same green was then poured over portions of the base coat. Cone 5.

Covered Jar. Cecil G. Strawn, Jr. Loose spirals were brushed on buff pot with wax emulsion. Bands of dark slip were brushed next and reserved with more wax. White slip was finally sprayed over-all. After bisque firing removed wax, a spray coat of transparent semi-matt glaze was added. All details show clearly through the velvety surface.

Vase. Wheel-thrown white clay sprayed with brown engobe. Wavy sgraffito lines. Bisque was sponged repeatedly with white matt glaze until lines were filled, then same frosty white glaze was sprayed over-all. Jerry Wilson, Huntington Park High School, California. Award, 29th National Scholastic.





Suggestions for Semi Matt Glazes

Semi-matt glazes possess a soft, slightly dull sheen. They are favorites for wax resist, inlay, trailing, overspraying and stenciling. Colored semi-matts are often selected for embellishment on other dull textured glazes. Transparent semi-matts are a popular covering for slip and underglaze decoration. Applications should be heavier than gloss glazes, and special care should be taken to maintain uniformity, because opacity and texture increase with glaze thickness. Spray application is best for all dull textured glazes. When brushing, add gum for smoothness, and use a large, fully charged brush to cover the surface in long, uninterrupted strokes. For all-over coverage, apply successive coats at right angles to each other whenever feasible.

Matt glazes have a soft, stony, velvety or dull eggshell texture which is very restful to the eye. For good textural development, application should be two to three times as thick as gloss glaze.

Nonflowing matts are valuable for glaze sgraffito, inlay, wax resist, stenciling and trailing, because they remain in place during firing. Tiny, undissolved particles or minute bubbles are usually suspended in this type of matt, causing the glaze to appear completely opaque, concealing the color of the clay or glaze beneath. Application should be very even, for the glaze will not flow enough in the firing to heal application faults.

Some matt glazes dissolve completely and flow easily. They owe their texture to the formation of fine crystals on the surface during slow firing and delayed cooling. Variations in firing time and temperature may affect the texture.

OVERSPRAYING One of the most luxuriant matt glaze effects requires only a simple overspray of one or a number of colors on the basic coat. Spray or spatter colors discriminately, one at a time. They will intermingle in the deep textured "pile" of the matt base coat. Contrasting oversprays offer rich accents for important contours.





CERAMIC MOSAICS

A ceramic mosaic is a surface decoration made by arranging small pieces of colored tile or pottery fragments, called tesserae, into a pattern.

Mosaic table tops, wall murals and fireplace or floor decorations can be tailor-made as to color, texture and shape when you prepare your own tesserae. Colored glazes are usually painted directly onto leather-hard clay slabs, then cut. Rolling, glazing and cutting tesserae is an excellent all-age group activity.

Tesserae for smooth table or floor surfaces should be the same thickness for easy mounting on a thin coat of adhesive. In contrast, wall decorations can be fashioned with jagged scraps of many thicknesses pressed into thick mortar. Light reflections on slightly tilted tesserae create color and depth effects unique to the mosaic art.



MAKE YOUR OWN HAND FIRED MOSAICS!

Unlimited Color Combinations!

1. Prepare a full size color plan. Keep design and color simple. Confine first project to a 12" square.

2. Select a clay and several glazes which seem to fulfill color and texture requirements. Soft textured matt glazes are pleasing on table tops because they cause no glare. Glossy glazes are jewel-like in wall panels. Apply similar type glazes over each other for variety. Colored clays modify glaze tones. Mature, colored bisque tesserae might be used for low-key mosaics.

3. Test fire the glazes on small slabs of the chosen clay. Label the back of each test carefully with underglaze.

4. Make your final glaze selections from these fired tests. Indicate placement of each glaze color on a tracing of the plan.

5. Prepare a clay slab for each color area. Wedge clay well and roll out on wax paper between sticks of identical thickness, $\frac{1}{4}$ " or more. Trim off all rounded edges when slab is leather-hard.

6. Mix and strain the glazes, using extra gum for strength. Brush glazes liberally over the damp slabs. Apply coats at right angles to each other when shine leaves surface. Postcard thickness is usually enough for glossy glazes. Matt glazes require more. Check glaze thickness and uniformity with a pin.

7. When glazed slabs are firm but not dry, slice slabs according to general indications on the sketch. Cut straight down. Square or oblong shapes measuring $\frac{3}{4}$ " or more are customary. Smaller pieces are tedious to set. *Prepare extra tesserae in all shades for a reserve.* For irregular contours, thin slabs can be sliced in long strips and fired, then broken into unsymmetrical tesserae as needed.

Tesserae can be pressed apart just before firing, but they usually detach easily afterward. Separating and reshaping are often executed during actual setting process.

8. Transfer damp slabs to kiln shelves. Slow initial drying prevents warping. Almost dry slabs can be fired slowly in a vented kiln. Some fired slabs may need reglazing. Other glazes are often applied over the originals to vary color and texture.

9. Slide fired tesserae onto tracing with a spatula. Check arrangement, fit and color. Make allowances for a space around each tesserae. Choose substitutions from reserve.



Mosaics by students of Sister Magdalen Mary, I. H. M., Immaculate Heart College, Los Angeles.

"Venite." Ellen Mills. If mosaic techniques were limited to a few stilted rules, this composition would not be shown. The tesserae vary greatly in size and shape. Certain colors have been placed at slight angles in magnesite to catch the light. Outlines are a combination of dark shades. Only a few portions are grouted.

Photograph by Sister Mary Corita, I. H. M.

"Joyful Mysteries." Maureen Markham. Bas-relief terra cotta figures and glazed mosaic background were attached to the rough side of heavy masonite with Miracle Thin-Set tile cement.

Photograph by Sister Mary Corita, I. H. M.

"Virgin Mary." Detail from **"Annunciation"** by Mary Jane Casey. Some tesserae have been glued on top of the smooth, grouted surface with Duco. Note the raised lines of the veil.

Photograph by Jack Macpherson.



Suggestions for Composing MOSAICS

Setting mosaics could be termed composing with color chips. The process of selecting and placing the small pieces into final position can easily take days or even weeks.

Tesserae can be separated or reshaped by hammering between two pieces of cardboard. For clean, predetermined breaks, nip each tessera near the edge with a long handled tile cutter. Rough projections can be smoothed down on a wet grindstone.

Arrange tesserae on fresh cement, using sketch *only* as a general guide. Start circular designs from center. Direction of setting is important to the design, and should be considered throughout. Space tesserae at close intervals or far apart, using a scattered, formal, or flowing style. *Tesserae should not touch.* If crowded, they will buckle as the cement dries. Keep work clean. Remove unwanted cement as each section is completed.

BACKINGS Choose a sturdy, waterproofed backing, such as $\frac{5}{8}$ " marine plywood, or the rough side of thick, tempered masonite. Metal, cement, plaster, old tile, etc. are suitable if inflexible, clean and dry. The weight of a mosaic will cause many backings to warp unless braced with wood or metal strips. Frames add sufficient rigidity for small projects. Do not set mosaics until all mounting, framing, and reinforcing are complete.

"FACE-UP" SETTING METHODS FOR MOSAICS AND TILES Any household cement will suffice for small indoor mosaics. There are several slow-setting "buttering type" wall tile cements. Hot dish holders and wall murals are often produced by buttering the back of each tessera and pressing it down immediately with a slight twist.

Horizontal surfaces may be set with "floating type" slow drying tile cements. A thin coat is spread over a few inches at a time with a wide-notched trowel. The tesserae are then arranged on the wet adhesive, and firmly pressed into it within the hour. Each section may be tamped with a flat board before proceeding.

Magnesite cement mix can be tinted with magnesite colorants, then mixed to workable stiffness with 22° magnesium chloride in a small paper cup. Spread magnesite over one small area at a time. Use a palette knife, for mixture may irritate delicate skins. Vary depth so bed is twice the thickness of tesserae. Embed each tessera at a slight tilt to catch tiny fragments of light.

"FACE-DOWN" SETTING METHODS Arrange tesserae right side up on sketch as they are to appear when set. Then apply rubber cement or water soluble glue to heavy paper strips and lower them gently onto the tesserae in overlapping rows. When tesserae are firmly bonded, the paper can be cut into sections for easier handling. Proceed according to type of project.

1. Indoor projects such as table tops, counters, small murals: Spread "floating type" cement over chosen backing. Set mosaic onto cement, paper side up, and tamp down gently. Remove face-mounting paper within the hour. Pry out any dislocated pieces, and butter each with more adhesive before replacing.

2. Projects to be exposed to wear and weather: Mosaics to be embedded in floor, terrace or garden should be mounted in permanent materials. Produce large, heavy mosaics in sections.

Place mosaic section paper-side down on a flat, nonflexible surface, and fit a sturdy wood or metal frame around it. (If you wish to remove frame later, coat inside with clay or a thin brush coat of paraffin oil to prevent sticking.) Mix Portland cement to cake batter consistency and work part of it into the spaces around the tesserae in the frame. Some tile setters use "rich cement" containing up to 50% sand for this step. Then pour the rest of the cement slowly over-all until 1½" to 2" thick or more. Embed a section of hardware cloth or chickenwire to add strength. Braces can be sunk into the top surface. When cement becomes firm, turn the mosaic over and loosen the glued paper strips with water. Sponge the surface clean. Cement will have filled all the fissures, so grouting with additional cement is usually unnecessary. Keep surface covered with water saturated burlap for several days while cement cures.

GROUTING Filling the crevices between tesserae with grout, a thin mortar, is a final and optional process. Grout helps to fix tesserae permanently in place and unifies surface appearance. It can be tinted generously with water color or tempera to blend with each section.

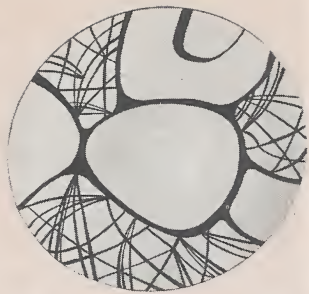
Moisten tiles, then mix commercial grout to a creamy paste and rub it into grooves. When grout has set a few minutes, sponge off excess. Prevent cracking and powdering by curing grouted mosaics for 72 hours under water saturated cloths or newspapers.



Left: "The Disposition." W. W. Swallow, Allentown, Pennsylvania. Glazed tesserae, individually cut. Browns, oranges, whites and turquoise. Cherry wood frames. The four panels depict a family of barn owls that lived in the artist's barn.

Above: "Saint Christopher." Phyllis Novins (also a student of Sister Magdalen Mary, I. H. M.). Irregular tesserae were cut and broken from long, fired strips. Variations in size and contour of each tessera add interest.

Photograph by Sister Mary Corita, I. H. M.



OVERGLAZES

Overglazes are unusually vivid low temperature ceramic colors which will fuse to fired glaze and metal enamel surfaces and mature porcelain bisque. They are often used to decorate figurines, tiles and ornamental dinnerware. A white or pastel background is best for maximum brilliance.

Semi-moist Overglazes are unique because they can be applied with water. Unfired colors wash off easily and will not stain fingers or clothing. A few drops of water on each color pan will soften the overglazes. Use a flexible spatula and tile to blend quantities of color with water. A thick, creamy consistency is good for brush, palette knife or finger painting. Overglaze for pen drawing, spraying and airbrushing should be ink-thin. The colors are easy to apply. Thin coats produce delicate tints and highlights, while thicker coats appear translucent to semi-opaque when fired. Pencilled guide lines burn out completely.

All colors may be applied and fired in one operation, especially when simple designs are used. However, complicated designs and all blending and shading usually require several applications and firings. China painters customarily fire several times. They apply one color thinly and anneal it in a Cone 019 firing before overspraying or overpainting with another. Blending colors in this manner produces livelier tones than intermixing. Thin spots can be touched up in later firings. Color intensity is easy to control when yellow tones are applied in the first annealing fire, followed by flesh, browns, reds, then blues. Liquid bright metals are often applied in the second or third firing.



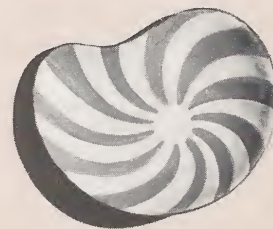
"William" Carolyn Walkup, Lamar H. S., Houston. Award, 1953 National Scholastic Exhibit. Solid buff clay sculpture with pastel blue-green low fire glaze. Yellow, black, and red overglaze flowers.

Top Left: Enameled Plate. Black overglaze was painted on glossy white metal enamel, then fired at 1350°F. until shiny. Blanche Hutto, Fort Wayne, Indiana.



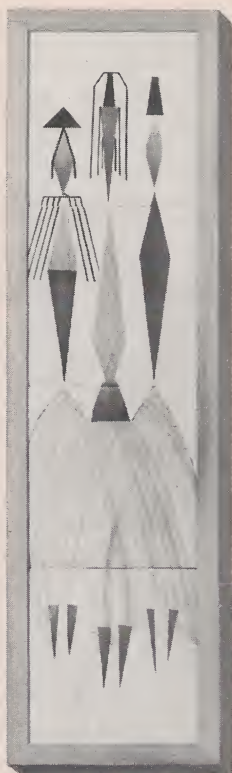
Flared Porcelain Bowl. Justin Brady. Clear high fire glaze over-all, fired to Cone 4. Airbrushed blue and yellow overglaze tints. Outlines painted with red. Cone 017 single firing.

Free Form. White overglaze brushed on opaque turquoise metal enamel. Lois Culver.



FIRING OVERGLAZE ON CERAMICS: Overglaze applications should be just thick enough to look opaque. Decorated objects may be stacked as soon as the overglaze loses its shine. Provide at least an inch of air space around each object to enable smoke to escape from the overglaze medium early in the firing. Leave the kiln door slightly ajar for air circulation until the kiln chamber begins to glow at about 900°F. and all smoking stops. Fire slowly to Cone 019-017 (1220-1418°F.). Overglaze decoration on stoneware and porcelain should be fired to the maximum (1418°F.), to allow the high temperature glazes to become tacky for better fusion with the overglaze.

FIRING OVERGLAZE ON METAL ENAMEL: Heavy applications are best on fired metal enamel. All colors are usually applied for one firing. Dry decorated enamel for at least twenty minutes in a warm place. Fire at 1325-1400°F. for about 1½ minutes in a preheated kiln. (Steaming and blistering indicate presence of moisture, and such pieces should be removed until dry.) Withdraw object at once when surface appears glossy. Clean blackened metal edges with a file or pocket stone. Do not use metal cleaner, because it might dull the overglaze sheen.



Tile Tray. Blue, gray, red brown, black, and yellow Versacolor airbrushed on four glazed tiles. Three separate Cone 018 firings.

Compact Lid. Blue and red Versa-Color silk screened on yellow metal enamel, fired to 1400°F.



AIRBRUSHING, PENWORK AND PAINTING Thin Versa-Colors with turpentine, which also acts as a speedy drier for these methods. Application should appear opaque, but not thick. For brush painting, use camel's hair or sable brushes because they hold more color and are easier to stroke. When airbrushing, mix in turpentine until the sprayer deposits the desired texture. Thin mixtures deposit a loose, spattery film, while thicker spray mixtures will cause a fine textured, heavier deposit. Delicate over-spraying creates excellent blended and intermingled effects. For use with a crow quill or gold lining pen, a sirupy paste is satisfactory. Add more turpentine for brush and finger painting on glaze and metal enamel.

Dry Versa-Color at Least Thirty Minutes before Firing. On glazed pottery, Cone 018 (1328°F.) is the recommended firing temperature for maximum gloss. The firing range is from Cone 019 (1220°F.) for a matt textured decoration, to Cone 016 (1463°F.). Some glazes may not become tacky enough at Cone 018 to form a good bond with the decoration. If the color does not seem to adhere to the glaze, the object may be refired as high as Cone 016 without loss of Color. The firing temperature for Versa-Color on metal enamel is 1325-1400 °F.

Versa-Colors

For Silk Screening, Airbrushing and Painting on Fired Glaze or Metal Enamel

Versa-Colors are finely ground oil-based ceramic pigments. The glossy semi-opaque colors have been especially designed for silk screening, airbrushing, penwork and stenciling on any fired glaze or metal enamel surface. They may also be applied to bisqueware which has been fired to maturity. Versa-Colors have a brilliant sheen when fired to Cone 018 (1328°F.), and look brightest over a clear transparent glaze on a white clay body. Colored glazes tone down the color contrast. Versa-Colors are matt textured on matt glazes and bisque.

SILK SCREENING Use viscous Versa-Color directly from the tube for silk screening. Lacquer stencil film or paper masks may be cut for stencils. (Even typewriter-cut mimeograph stencils will print clearly.) A fine screen weave (12XX) produces a thin, even application of color. Coarser (10XX) silk will deposit more Versa-Color, leaving the pattern of the screen in the print. Deposit thickness can also be regulated by controlling the pressure of the squeegee. Much depends on the effects desired.

Application should be thin, in order to allow combustible gases to escape during firing. Excessive application would cause blistering and bubbling. An adequate drying time of about thirty minutes has been planned so that the pigment will not clog the screen mesh by drying during the printing. Allow the first coat to dry before applying another coat over or beside it.



Emblem Tile 6" Square. Glossy surface was airbrushed with Versa-Color mixture of yellow, white, and black. Panels were screened through 12XX silk using a brown and white blend. Harp was screened last, using brown alone. Single fired slowly to Cone 017.

All examples by Justin Brady.

Liquid Bright Metals



Liquid bright gold and platinum are lustrous overglaze gilding solutions. They fuse to fired gloss glaze and metal enamel in a thin, shiny layer at low temperatures. No burnishing is required. Because of their brilliance, they are usually applied sparingly, as decorative accents. The metals appear matt-dull on matt glaze and hard bisque. Pencil guide marks show through fired metals, while India ink burns out. Liquid bright metals for glass are used on metal enamel.

Application Stir well. Apply a thin, but dark and opaque coat to the clean surface with a brush, pen or airbrush. Select a No. 00 sable brush or a pen point for narrow lines. Proceed with care, because mistakes often leave purple streaks after removal attempts. Saliva or alcohol on a cotton swab are best for removing unfired liquid metals. Clean brushes and thin too thick solutions with gold essence. **Liquid metals should be completely dry before firing.** Damp applications may blister. The customary overnight drying time can be reduced to thirty minutes by using an infra-red lamp.

Firing Liquid Metals on Glazed Ware When stacking gilded ceramic objects for firing, provide generous air spaces around each, to allow volatile gases to escape easily. Prop kiln door open several inches and keep spyhole open until kiln interior becomes a dull red. Liquid metals have a wide firing range; from Cone 019 to Cone 015 (1220-1481 °F.).

Firing Liquid Metals on Metal Enamel When metal application is dry, fire piece for two to three minutes at 1220-1450 °F. in a preheated kiln. Kiln chamber should be rich red, not orange. Remove pieces about a minute after metal color appears. If enamel has developed cracks, continue firing briefly until cracks reheal. Clean blackened copper edges with a file or by scouring. **Important!** Do not immerse fired bright metals in metal cleaners because metallic shine would be destroyed.

Underfired liquid metals rub off easily, and may appear dull or corrugated. Refire to correct temperature. Thin spots may be touched up and refired. Overfiring reduces brilliance. The gilding burns off entirely when greatly overfired.

DIPPING Gradually float tiny droplets of one or both liquid metals onto the surface of a large bowl of water. To marbleize, swirl the surface with a pin. The immersion process resembles Easter egg dipping. Coated areas can be overlapped carefully. Some glazes and enamels produce a crackle pattern when covered over with liquid metals.

Bowl. Gold foils embedded in fired transparent brown metal enamel. *Liquid gold pen lines were added and fired to 1300 °F.* Blanche Hutto.

"Sprite." Yellow, green and black underglaze washes on modeled white clay dish were tinted with clear blue glaze. *Gold accents were affixed at Cone 018.* Mae Reed, Indianapolis.

Terra Cotta Mask. Clear glaze. *Relief details were brushed solidly with gold.* Mae Reed.

Bottle. Fired Chinese red gloss glaze surface was dipped on each side into gold and water bath and refired to Cone 018. Justin Brady.



Glass Colors

Glass decorating colors fuse indelibly to all kinds of glassware at very low ceramic temperatures. The satin-smooth colors are opaque and brilliant, as well as permanently washable and acid resistant when fired to 1000-1150 °F. They are equally successful when used to decorate fired metal enamels at higher temperatures.

Glass colors are soluble in water or alcohol, and may be applied directly from the moistened pan with a sable brush. Allow the thick, creamy colors to flow on, then coax them about until the surface is evenly covered. Use a thin mixture for stenciling, finger painting, airbrushing, silk screening and pen drawing.

Applications should appear opaque, but not piled up. Overspraying and overpainting are the most effective methods for color blending. Touch up any thin spots with a brush before firing. Plan to fire glass colors only once. Liquid bright glass gold and platinum accents may be applied in about thirty minutes when the glass color is dry.

Firing Glassware Glass colors fuse thoroughly and look brightest if the glass object is fired slowly until the glass surface starts to soften. This softening range can be determined by firing a representative sample until it starts to deform. Subtract 50° to determine a safe color fusing temperature for that particular kind of glass.

Use your largest kiln, and protect the shelf with kiln wash. Place glassware about an inch apart, and as far from the elements as possible. Kiln openings should be propped ajar until all smoking stops. Then close all openings tightly to keep kiln heat evenly distributed. Watch progress of glass color firings carefully through peephole after 1000 °F. Turn kiln off immediately when correct temperature is reached. Always use cones (and a pyrometer, if possible). Wide plates and flaring bowls do not absorb heat evenly, and require special attention for signs of warpage near the high point of firing. Thick cylindrical waterglasses are usually the sturdiest shapes. Turn kiln off immediately if a shape starts to warp. *It is especially important that glass objects should heat and cool very slowly, or they may shatter.* Open kiln only when interior is room temperature.



Firing Glass Color on Metal Enamel Applications should dry at least thirty minutes in a warm place. To fire, insert object in a preheated kiln for 1-2 minutes at 1400-1500 °F. Remove at once when surface appears glossy.

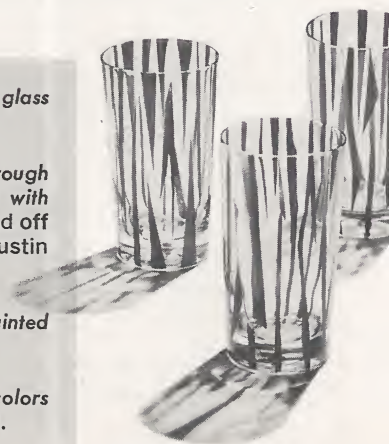


Wind Chimes. Multicolor designs brushed on glass strips. Cone 021. Justin Brady.

Water Tumblers. Stencil designs were cut through masking tape on the tumblers, then sprayed with black glass color. Remaining tape was peeled off easily when color was dry. Cone 021. Justin Brady.

Punch Cups and Saucer. Disks were finger painted in red and black. Cone 021. Lois Culver.

Pin. Orange, black, and turquoise glass colors brushed on yellow metal enamel disk. L. Culver.



Glass Colors

HOW TO MEASURE KILN TEMPERATURE

Pyrometric cones are the most accurate indicators of the effect of time and temperature on ceramic materials. They absorb heat like the ware being fired because they are made of ceramic materials also. When the chosen cone bends, it is a definite indication that the end point of the firing has been reached.

Three cones should be used, one to deform at a lower temperature, one at the correct temperature, one at a higher. They should be lined up at an 80° angle in a dry clay pat, and placed on the kiln shelf in full view from the spyhole.

The first "warning" cone will bend just before the correct heat has been attained. The firing should then be watched very carefully. When the tip of the middle cone touches the clay pat, the desired temperature has been reached. The third or "guard cone" must not bend appreciably if overfiring is to be avoided.

A **Pyrometer**, which indicates the actual kiln temperature, can be used in addition, to measure heat rise.

Fired objects should not be removed from the kiln until they are cool enough to touch.



Spyhole view of
cones at end
point of firing.

SLOW vs. FAST FIRING

Almost all ceramics benefit from slow firing. Greenware can be fired at low and medium heat for an hour or more than usual to insure dryness.

Glazes improve in fit, color and texture with a "soaking" period at temperatures which linger just below the maturing point of the glaze. The kiln door or spyhole can be opened for a time following the bending of the warning cone. When the correct cone has gone down, the kiln may be switched to medium to allow the heat to decrease slowly, while the glaze "soaks" in the fluid state for an extended time. Glaze surfaces will be smoother because entrapped glaze gases will escape slowly without pinholing. Slow cooling often aids texture development in matt glazes. With the exception of red, glaze colors seem to benefit from slow cooling also.

TABLE
TEMPERATURE EQUIVALENTS
Orton Standard Pyrometric Cones*

October, 1954

CONE NUMBER	LARGE CONES (1) 108°F 270°F	SMALL CONES 540°F
022	1085°F.	1112°F.
021	1116	1137
		1189°F.
020	1157	1175
019	1234	1261
018	1285	1323
017	1341	1377
016	1407	1458
		1517
015	1454	1479
014	1533	1540
013	1596	1566
012	1591	1623
011	1627	1641
		1549
010	1629	1641
09	1679	1693
08	1733	1751
07	1783	1803
06	1816	1830
		1846
		1873
05	1888	1915
04	1922	1940
03	1987	2014
02	2014	2048
01	2043	2079
		2152
1	2077	2109
2	2088	2124
3	2106	2134
4	2134	2167
5	2151	2185
		2230
6	2194	2232
7	2219	2264
8	2257	2305
9	2300	2336
10	2345	2381
		2426

(1) The rate per hour of heating up the cones during the last several hundred degrees of the test.

Note 1. Temperature equivalents were not determined for Small Cones 022, 014, 013, 012, and 011.

Note 2. The temperature equivalent values given in this table apply only to Orton Standard Pyrometric Cones when heated in an air atmosphere at the rate of heat shown. The temperature equivalent values are furnished for information purposes only. They are not necessarily the temperature actually in a furnace when the cone goes down.

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THE EDWARD ORTON JR. CERAMIC FOUNDATION

1445 Summit Street • Columbus 1, Ohio

COMMON FIRING DEFECTS AND REMEDIES

Wet clay will *shatter* during firing.

Ware should be bone dry.

Large air bubbles in poorly wedged clay can cause *shattering* also.

Poorly constructed pieces are liable to *crack* or *warp*.

Blisters in the glaze may indicate *too fast firing*.

Glaze may have been *insufficiently stirred* before application. Apply another thin coat of well stirred glaze and refire.

Pinholing in glaze suggests *too rapid cooling* or *improper application* (*entrapped air*).

Glaze application should be smooth. Reglaze thinly.

Glaze crawling may be caused by *damp, dusty* or *greasy ware*.

Too heavy an application is a common cause of crawling.

Glaze may run off article.

Underfired glazes sometimes crawl.

If you wish to refire, try sponging another color into the separated areas for a mottled effect.

Unfired glaze applications which show a *crackle texture* are apt to crawl in the fire. Toughen the glaze mixture with gum. Do not use too much, or application will shrink excessively as it dries.

Sandpapery surfaces on fired glaze indicate *underfiring* or *skimpy application*. Reglaze, fire to correct cone.

Matt glazes may *shine* if *overfired* or *applied too thinly*.

Too rapid cooling (or firing) or **stacking too closely** will cause glazed ware to *shatter* or *craze* because heat is absorbed or released unevenly.

Overfiring will cause almost any glaze to *run*.

Overfired bodies may *deform* or *melt*.

Crazed glazes contain fine cracks which do not penetrate into the body. A fine netting of crazed lines is often produced intentionally and called crackle.

Apart from *too rapid cooling*, glaze crazing may be caused by a *poor fit* between the body and the glaze. The clay should be fired to maturity either in the bisque or glost firing for a better glaze fit.

Excessively thick applications can cause crazing. To reduce crazing, most glazes can be fired slightly higher than recommended.

Your manufacturer takes great pains to secure a good fit between his clays and the glazes he specifies for them. USE ONLY THE GLAZES RECOMMENDED FOR EACH BODY. Purchase all your materials from the same manufacturer for consistently good results.

GLOSSARY

Bisque or biscuit. Unglazed fired clay.

Black-hard. Nearly dry clay which is no longer plastic.

Body. Clay or a combination of clays and minerals of which a pot is made. Also the fired form itself.

Bone dry. Very dry clay ready for firing. Feels warm.

Burnishing. Rubbing half-dry clay until lustrous.

Casting slip. Deflocculated clay for mould pouring.

Ceramic. General term applied to any product of non-metallic earthy materials requiring high temperature treatment.

Clay. Decomposed feldspar reduced to an earthy substance by weathering. Plastic when wet, hard when dry and permanently hard when fired.

Coil-built. Ware constructed with clay coils.

Dipping. Coating biscuit or greenware with liquid glaze or slip by brief immersion.

Engobe. Clay slip, usually colored, applied to an unfired or fired body as a decoration. It does not fuse like a glaze, but can be covered with glaze.

Fettle. To ready for firing by trimming off rough edges and smoothing with a tool.

Frisket. A stencil, usually paper or liquid rubber latex.

Glazes. Vitreous (glassy) coatings which are fused on ceramic bodies to protect and beautify.

Glost firing. Glaze firing.

Greenware. Unfired clay objects.

Grog. Granulated burnt fireclay.

Jigger. Machine which mass produces clay objects by forcing a template against a rotating mold partially filled with clay.

Leather-hard. Partially dry semi-plastic clay of a leathery consistency suitable for carving, underglaze decoration, etc.

Maturity. End point of the firing, at which a clay or a glaze attains its best development.

Metal enamel. A thin layer of glass fused onto the surface of a metal.

Pyrometer. Optical or electrical instrument for measuring high temperatures.

Pyrometric cones. Pyramids made of minerals similar to ceramic ware which accurately indicate the effects of time and temperature on the ware being fired. They become soft and bend under advancing heat at known temperature intervals.

Rubber latex. Liquid rubber, often used as a frisket to protect clay from decorating materials. Rubber resist.

Slab-built. Ware constructed with clay slabs.

Stilts. Biscuit supports for firing glazed ware.

Tessera (tēs'ēr • ā), n.; pl. -SERAE (ē). A small piece of marble, glass or fired clay, often having a square face, used in mosaic work, as for pavements, walls, murals, etc.

Venting. Providing a small opening in the kiln for the escape of vapors.

Wheel-thrown. Pottery formed upon a potter's wheel.

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Cookie Jar. Red body. White matt glaze poured over a spray coat of brown matt. Cone 04 firing caused cover glaze to appear transparent and gray-green over the brown. John S. Howald, Columbus, Ohio. Prize, 14th Ceramic National.



Mountain Goat. Incised and polished red bisque. The small sculpture was probably burnished with a smooth pebble when black-hard. Richard Melendez, Hollywood H. S., Calif. Award, 26th National Scholastic Exhibition, Carnegie Institute, Pittsburgh.

PRODUCT LISTING

Clays, Glazes Decorating Colors

AMACO AND FINE-ART MODELING AND THROWING CLAYS

White Talc Modeling Clay No. 25—Compounded white earthenware body, fires white. Firing range Cones 06-02.

White Sculpture Clay No. 27—White burning clay with medium mesh buff grog. Fires white at Cone 05, light cream at Cone 4.

Low Fire Clay No. 35—White and 6 colors. Compounded earthenware body. All purpose, fine, dense body; popular for jewelry making. Firing range Cones 08-02.

Raku Modeling Clay No. 45—Special formula red firing clay for ancient oriental firing process. Withstands fast firing and cooling. Firing range Cones 08-06.

Buff Firing Clay No. 46—Natural stoneware clay. Firing range Cones 06-10. Buff color at Cone 4, soft gray at Cone 10.

Red Firing Clay No. 47—Natural greenish-gray earthenware clay. Light red bisque. Firing range Cones 08-05.

Stoneware Throwing Body No. 48—Compounded of several clays and medium mesh grog for texture. Warm buff bisque with dark specks. Cones 4-8.

Porcelain Modeling Clay No. 65—Compounded white high fire body. Translucent when thin. Cones 3-6.

Indian Red Clay No. 67—Natural earthenware clay. Rich red before and after firing. Firing range Cones 06-02.

Egyptian Paste No. 70-D—Low fire self-glazing body. White and 7 colors in dry form. Gloss color develops when fired. Cone 06-05.

Terra Cotta Clay No. 77—Compounded earthenware body with medium mesh grog. Wide firing range Cones 06-5. Deep red bisque at Cone 4.

AMACO AND FINE-ART CASTING CLAYS

White Talc Casting Clay No. 15—Compounded white earthenware body, fires white. Firing range Cone 06-02.

The American Art Clay Co., Inc., a manufacturer of ceramic equipment and supplies, sponsored this book to encourage the use of clays, glazes and ceramic decorating materials. Many of the products listed below have been used in the examples selected for discussion on the preceding pages.

Low Fire Casting Clay No. 40—Compounded white earthenware body. Firing range Cones 08-02. All purpose, fine, dense body.

Raku Casting Clay No. 45—Special formula red burning clay for ancient oriental firing process. Withstands shock of fast firing and cooling. Cones 08-06.

Buff Firing Casting Clay No. 46—Natural buff stoneware clay. Wide firing range Cones 06-10.

Porcelain Casting Clay No. 55—Compounded high fire body, 7 colors and white. Translucent when thin. Firing range Cones 3-6.

Indian Red Casting Clay No. 67—Natural earthenware clay. Rich red before and after firing. Firing range Cones 06-02.

AMACO GLAZES

LG—LM—LT Liquid Glazes—46 opaque and transparent glazes in gloss, matt and textures. Cones 06-05.

Crystaltex Glazes—12 liquid glazes colors, each containing one or more crystals of contrasting or harmonizing hue. Cones 06-05.

Majolica Gloss Glazes—34 opaque and transparent colors, liquid or powder form. Firing range Cones 07-02.

High Fire Glazes—25 opaque and transparent glazes, liquid or powder form. Firing range Cones 4-6.

Opaque Enamels—22 gloss, opaque colors, liquid or powder form. Firing range Cones 06-02.

Low Fire Crackle Glazes—27 opaque and transparent colors, liquid or powder form. Firing range Cones 012-06.

Opalescent Glazes—9 high gloss colors, liquid or powder form. Usually iridescent, especially on red clays. Firing range Cones 06-03.

Alligator Glazes—12 colors, liquid or powder form. Variegated, crepe textures with mingling of mat and gloss. Firing range Cones 07-04.

Matt Glazes—12 semi-matt colors, liquid or powder form. Firing range Cones 07-05.

Art Matt Glazes—18 liquid or powder glazes. Velvety matt finishes. Firing range Cones 06-02.

Free on request—a 60 page catalog **Amaco Pottery and Metal Enameling Supplies and Equipment** listing electric kilns, wheels, clays, glazes, decorating colors, metal enamels and supplies. Write Ceramic Department, American Art Clay Co., Inc., Indianapolis, Indiana 46222.

AMACO ENGOBES

SE-Series—18 rich earth colors and subdued hues in powder form. Recommended for decorating greenware.

Self-Glazing Engobes—12 vitreous, non-flowing composition, liquid or powder form. Develop gloss or matt finishes when fired at Cones 07-02.

AMACO AND FINE-ART UNDERGLAZE DECORATING COLORS

Liquid Underglazes—24 intense, opaque colors. Brush or spray on greenware or bisque.

Semi-Moist Underglazes—24 intense colors in water color type pans or commercial size jars. Apply with brush, pen, airbrush, silk screen.

Underglaze Crayons—16 concentrated colors for pastel-like sketches on bisque.

AMACO—FINE-ART—VERSA COLOR OVERGLAZE DECORATING COLORS

Semi-Moist Overglazes—16 colors. Apply with water, using brush, pen or airbrush. Fire at Cone 018 on glazed pottery; at 1325°-1400° F. on metal enamel.

Liquid Gold and Platinum—Liquid bright metals. Fire to Cones 019-017 on glazed pottery; at 1400° F. on fired metal enamel surfaces.

Versa-Colors—8 oil base colors, developed especially for silk screen printing on glazed tiles. Also suitable for application on any fired glaze or metal enamel surface with brush, pen or airbrush. Fire to Cone 018 on glazed pottery; at 1325°-1400° F. on fired metal enamel.

Glass Decorating Colors—8 brilliant semi-moist colors. Generally fired on glassware to 1000°-1121° F.; on metal enamel at 1300° F.

AMACO METAL ENAMELS

AR-Series—Acid resistant. 34 opaque, 14 transparent, and 8 crackle enamel colors. Fuse at 1350°-1450° F.

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